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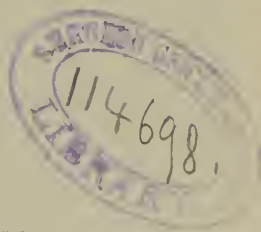
A TEXT-BOOK
ON
MEDICAL JURISPRUDENCE;

FOR
MEDICAL AND LAW COLLEGES:

BY
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PREFACE.

THE present work on Medical Jurisprudence is the outgrowth of a long-felt necessity in Medical and Law Colleges for a more condensed, and yet explicit and complete, form of what is required in a *Text-Book* in Colleges. The several excellent treatises, as those of Taylor, Beck, etc., are entirely too cumbrous and expensive for such work.

The author of the present work has studied much as to how this *desideratum* might be supplied, and has arrived at two well attested points: *First*, a great improvement in gaining space may be effected in curtailing citations of *cases in illustration* and *court precedents*. Of these, the two-volume work of Tidy has, in several instances, as many as 82, 86, and in one even as many as 137 citations, though in this latter several points are included; while Taylor and Beck are nearly as profuse in citations, thus making the work of the one 933 and the other 1413 pages of close print. This bulkiness ruins these works for use as college text-books, and gives them their place only in the libraries of the law and medical practitioners as reference books. One-half dozen citations of *cases in illustration* and of *court precedents* are abundantly sufficient for any case. The other point made is in matter of *details*: these must never be prolix in a college text-book—the whole must be put into small compass.

The improvements made in these regards have enabled the author to comprehend every important point in Medical Jurisprudence contained in the voluminous works of Taylor and Beck, and have afforded space also for two very essential subjects that those works do not contain. These are: *First, the liabilities of physicians, surgeons and accoucheurs to the laws in matters of their own practice*; *second, the methods of procedure in post-mortem examinations*. It is believed that in all this a good service is done for Medical and Law Colleges.

THE AUTHOR.

Tallahassee, Fla., 1885.

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MEDICAL JURISPRUDENCE.

DEFINITION AND HISTORY.

THE casualties of human life—but more still, the cruelties of man to man—have brought the two liberal professions of Medicine and Law into very close correlation, and hence a very important study of both runs in the same line. This is Medical Jurisprudence, or Forensic Medicine, as otherwise called.

The courts that come into such extensive service to the business world—to maintain equity and justice to all—exist as a necessity, also, for the protection of life and health. In this service the lawyer and doctor are equally important.

Again, it is very well known that the profession of medicine does not make its votaries more honest than are others; and the opportunity afforded in a calling so far removed from popular knowledge gives every chance for imposition in practice. It is remarkable that there is not more of this than is apparent. But even as matters are now, the lawyer, who has been facetiously called a supernumerary in society, comes yet into handy service as

a guarantee for correct medical practice. Thus the court services to society are twofold: they protect against violence and murder by the hands of the assassin, and the imposition and fraud of the medical misanthrope and imposter.

Medical Jurisprudence contemplates witness service from the physician as an *expert* rather than as to matters of simple *fact*.

HISTORY: As early as the time of Menes, in Egypt, there was recognition of medicine in its legal bearing. A law existed then which forbade the infliction of corporeal punishment on the pregnant female.

The Hebrews had a law by Moses requiring the priests, who were then the physicians, to institute quarantines for leprosy. They were required also to inspect wounds for legal inquiries.

Ancient Rome and Greece had each various laws relating to medicine. In the case of Cæsar, a post-mortem examination was held on the body by the physician Antistius, who pronounced only one of the twenty-three wounds that had been received by the consul as necessarily fatal. Tacitus mentions evidence of poisoning in the deaths of Germanicus and Agricola in such a way as indicates that attention was given to such particulars in law. In the "Twelve Tables" of Roman law the period of three hundred days was set for the time of human utero-gestation, and this related to law. In the Justinian code the legal phrases are such as give unmistakable evidence of legal enactments relative to the practice of medicine.

But by far the earliest discussions of Medical Jurisprudence must have occurred among the Hindoos; for we find in the "Agur Veda," which is accredited to Brahma—mostly lost now—there is evidence that a knowledge of the human frame was possessed, whereas it was, nevertheless, at an earlier period still of Hindoo history that dissection of the human body was prohibited by law. These facts the author finds in a rare work in his library—"Ainslie's Materia Indica" (London, 1826). Thus this advance of anatomical knowledge, beyond the proscriptions of law, shows plainly that forensic medicine was in practice. Furthermore, it may be observed that the Shastree Brahmins very carefully guarded the *vedas*, or sacred writings, from pollution by the *vydias* (physicians) because they were *sudras* (workers), thus showing that the caste element of society required law for the government of medical practice.

Medical Jurisprudence as a *science*, however, bears the date of a much more modern time. It was in the sixteenth century that Charles V, at the diet of Ratisbon, 1532, secured the adoption of a code; written out by Baron Schwartzenberg at the instance of George, Bishop of Bamberg. By this law the civil magistrates were, in all cases of doubt in matters of homicide and personal injuries, to procure a *medical expert* to examine the cases and give testimony.

It is to the credit of Forensic Medicine, which had now become a science in Germany, Italy and France, that the terrible superstition of what was called the "*Dark Art*"—sorcery or witchcraft—was overthrown. It is computed

that in Lorraine alone 900 victims, and in Treves 6,500, had perished in the flames from the fanatical persecutions in five years. Thus had the brilliant achievements of Medical Jurisprudence adorned civilization on the Continent at the dawn of human progress. The practice of the science was now under a regular code.

At the close of the sixteenth century quite a number of treatises had appeared on Medical Jurisprudence. Among these were the works of S. Pineau, of Paris; F. Fidele, of Sicily; Ambrose Pare, and others of other countries. In 1621 to 1635, in various editions, there appeared the famous work of Paulo Zacchia, of Rome, which gave character to the science for many years.

Professorships of Forensic Medicine were established in various universities in Germany, Italy, France and Holland, as afterward in England.

It is remarkable, however, that England, which had departments of medicine in all its great universities, had still no chair on Medical Jurisprudence until 1801, when Dr. Duncan gave a course of lectures thereon in the University of Edinburgh, and then, in 1803, a regular professorship was settled on his son by the government.

The first British work on the subject appeared in 1816, by Dr. Male, which was a small book. A few other English works of diminutive character appeared, as those by Drs. Hanslam, Smith, Hutchison, Christison and Far, until A. S. Taylor, M. D., F. R. S., of Guy's Hospital, brought out the famous treatise, now republished in Philadelphia, with additions by J. J. Reese, M. D., of the University of Pennsylvania, and which is now one of our

standard works. But it, like that, equally valuable, by Dr. Beck, comes too high for use as a text-book at college, except rarely. The Germans and French have also produced valuable works on this subject.

SCOPE OF THE SCIENCE.

All treatises on scientific topics are liable to be diffusé in their scope, and hence most of the standard works are not well fitted for class use at college. It is hence the object of the present work to place the necessary facts to be discussed at college, in a course on Medical Jurisprudence, in a form sufficiently concise to bring the student reader easily along with the course; while also the lecturer, if he follows the same plan of this work, will find the book of equally practical convenience.

There are two distinct classes of students that have occasion for the use of a text-book on Medical Jurisprudence while at college. They are the *Medical* and the *Law* students. Neither can now do without such a work, as methods of the teaching in this branch are now pursued. There are now mostly only a limited number of lectures given, that come in once or twice a week; and the classes are required to read up to the standard. Hence, when the student takes up a ponderous volume of 900 or more pages, like that of the American edition of Taylor, or of Beck, while there is the necessary attendance of six or more daily lectures besides, the diffuse reading bewilders the mind to such an extent as makes such a work less desirable. These standard works are

very proper for the preceptorship studies, and as reference books and works of continued study of the practitioner.

SCOPE FOR THE MEDICAL STUDENT: The course for the prospective physician comprises prominently: *First*, that which relates to his own protection in his professional pursuit; *secondly*, that which concerns his qualification to appear in the courts and before coroners' juries to give *expert testimony*.

The medical student must bear in mind, while he is endeavoring to qualify himself for his responsibilities in this department of his practice, that at his appearance in courts he is ever likely to be confronted by lawyers that have pursued the same studies, and that his expert testimony is required to be intelligently given.

Medical men, in testifying in courts, have sometimes presumed upon their special professional knowledge, on the supposition that lawyers are somewhat less ready in medicine than in law, and hence are not supposed to make it difficult to go through even what may be called a close cross-examination. But such are not unfrequently brought into trouble.

The physician should ever bear in mind that his duties owed to the civil commonwealth are important, and require thorough study of this subject, so that his testimony may do full justice to each party to a suit. Then he should bear in mind, also, that a lawyer will hardly go into court for the management of a case of malpractice in a criminal prosecution without being himself well posted in Medical Jurisprudence. Hence, it often proves the case that medical men, in giving testimony in court,

occasion no inconsiderable notoriety. This may be for the *better*, but may also be for the *worse*! A physician may, in a single hour in court, make for himself a reputation that may be greater than he might otherwise effect in an entire year! Nay, *more*! a man may do what will follow him in effects for a whole after lifetime.

SCOPE FOR THE LAW STUDENT: The law student requires a careful study of all those particulars necessary to the study of the medical student. And he can not become an able forensic or criminal lawyer without such study. Since all the cases that require expertness or forensic skill are usually very important ones, life or death often depends on the issues; and it is seldom that extra fees and extra solicitude do not obtain in the case.

It seldom fails to be the case that medical witnesses are plied with great solicitude, and so go into court, possibly with strong prejudices. If the lawyer, in such case, is not the full equal in his knowledge of this specialty, the expert testimony may do injustice of irreparable character. To the medical man it is quite an event to go into court with expert or professional testimony, and the lawyer may as well expect to find the physician well posted.

THE PHYSICIAN

AS AMENABLE TO THE LAW IN MATTER OF HIS
OWN PRACTICE.

It has already been stated that the doctor holds a double relation to the law—one that concerns his own skill and faithfulness in practice, the other his services as an expert or professional witness.

If every individual were competent to judge for himself in matter of his medical needs, the responsibility of the physician would not, perhaps, be a matter of recognition. But it is far otherwise. The sick man sends off for a doctor, and then has to take his medicine without ability to judge of his competency or the fitness of his prescriptions. The lawyer, in sooth, thus becomes a kind of protector to the community. Medical Jurisprudence, in this connection, therefore, has its kindly service; and the effect is, that those men who go into the medical profession are more certain to qualify themselves for their business.

There are three lines of his profession that have each its special requirements. These are Medicine proper, Surgery and Obstetrics.

AMENABILITY IN MEDICINE.

CHAPTER I.

DIAGNOSIS—LIABILITIES IN.

AT the very outset of the treatment of a case of sickness the physician's responsibility begins. And here is a very critical stage of his proceeding. If he makes a mistake in this particular, he can not easily rectify it. The disease not only runs on, but it becomes complicated by the wrong treatment which the diagnostic mistake had occasioned. Now, unless the normal conservative force proves victorious, or some accidental relief supervenes, a serious result is possible, and at least some damage is done.

Should the physician be prosecuted for malpractice in this case, and a skillful lawyer be in the management, the doctor will be greatly worsted by his deficiency in diagnosis, even though the suit may not have been brought on this ground. Lawyers who are versed in Medical Jurisprudence are ready to criticise each and every point; and if the physician has been mistaken in diagnosis, and has prescribed for another disorder than that which really was the ailment, then a strong point can and will surely be made. Diagnosis, therefore, is quite important. The fundamental for this study is, obviously, physiology, embracing temperament, idiosyncrasy, habits of life, age and circumstances of exposure.

An aptness to detect by the eye is a great accomplishment; this may first comprise the general *ensemble* of the case. Then comes the special particulars: the ap-

pearance of the skin as to dryness, heat, roughness, softness, color. The expression of the countenance must not have escaped attention at the start. Interrogatories should be directed always to the patient, if not too ill; then to the one present that may seem to know most of the case. The answers are to be carefully noted in mind. The pulse comes next for observation. To determine by this for diagnosis, a full acquaintance with the character of the *normal* pulse must be premised, and careful noting of every variation, and the value thereof, will afford a very prominent element in diagnosis.

Auscultation is now in order, and here there applies what was said of the *normal pulse*, for the practitioner should certainly know what are the natural phenomena that come into this observation. The sound of respiration is not always distinct, but generally so, and here is afforded an element for diagnosis. In the matter of the sound of the passage of the blood through the heart, the same facts are observable. The valves have their normal and their abnormal sounds, and these are to be noted accordingly. The point most available is over that region of the heart not covered by the double reflection of the plura.

Percussion may next claim attention. This relates chiefly to what may be discovered in the chest; and, as in the former particulars, the physician must know what the facts pertinent are in the normal state. The natural dullness at the place over the heart must not be inadvertently confounded, and this remark applies whether the percussion be on the front or back of the chest. The general dullness of sound all over the chest, observable in the very common complication of dropsy with phthisis pulmonalis, must be discriminated. In cases of tumors in various parts of the body, percussion with oscillation is made available in diagnosing the physical condition of the contents.

PROGNOSIS—NOSOLOGY—POSODOLOGY: Next to the determining of the distinction of the symptoms and identity is the knowledge of the course and probable termination of the disease, or *Prognosis*. Should the physician be mistaken in this, and so fail in the matter of his predictions—that is, should the course of the disease be otherwise than he had stated it would be—such fact may be to his prejudice; it may be taken into account in specifications of charges in prosecution. So, also, the matter of name; and hence, in *Nosology*, he may give ground for specifications in charges. If the physician should be proven to have named the disease he treated differently from that which expert testimony may show from the symptoms that it really had been, this fact will go against him. Likewise in matter of *doses*, and so in *Posology*, there is importance that he should make no mistakes. Overdoses are always harmful; and if even the ground for a prosecution may be other than this, and even though no serious mischief may have been occasioned by any overdosing, or failure happened from an insufficient quantity of medicines, yet a mistake in these particulars will work prejudice to his case. Overdosing is really malpractice, and makes the physician liable in the law.

THERAPEUTICS—LIABILITIES IN.

The immunity of the medical practitioner in the law relates greatly to his knowledge of *Therapeutics*. What the use of his tools is to the mechanic, such is Therapeutics to the physician; he should thoroughly understand the use of remedies. If, when examined in court, he should prove to be even *thorough* in his knowledge of anatomy and physiology, and of other branches of medical science, yet, if he be deficient in Therapeutics, it will be highly prejudicial in his case.

The indications of cure are all-important, and the physician can not safely allow himself to be deficient here. Therapeutics is the common boast of the quack; although he may not have the learning to enable him to use the term, he still boasts of his *skill to cure*. No prosecutor in a case will ever be likely to overlook deficiencies in this particular.

USE OF ANÆSTHETICS—LIABILITIES IN.

As there is more or less danger in the use of agents for the purpose of destroying sensibility, the physician is properly held accountable for his knowledge and skill in the use of them. It is in surgical practice where the pertinency of this matter mostly obtains; but in obstetrics and general practice the use of these agents has now become more or less popular, and all who have to do with the practice of medicine, surgery and obstetrics stand amenable to the law for a most thorough knowledge of these powerful and peculiar agents.

CHLOROFORM, ETHER, HYDRATE OF CHLORAL, MORPHINE, ALCOHOL and CAMPHOR are the most common agents employed as anæsthetics, and their properties should be very thoroughly studied.

The questions concerning these articles of the *Materia Medica* are so important in their character and involve so many doubts about the safety of their use that many authorities in medicine reject them. Mooted questions are ever not only of interest, but of importance. Of course there are intricate points about them, and difficult ones, or otherwise they would become settled. Hence, these questions are ever likely to be presented, and those not posted will be judged by their deficiencies. Still, this is not the most important feature of the question; for while every one can be sure to be exempt from blame

and from prosecutions for malpractice, he yet owes his highest duty to the cause of humanity. To keep free from exposure of human life to dangers is a high moral obligation; and certain it is that no medicines in the whole collection of remedial agents are so liable to do harm or endanger life, in the ordinary use of them, as are the anæsthetics. The tetanies, narcotics and acrid agencies are, of course, liable to dangerous use, and need to be carefully studied, and overdosing with them is to be avoided; but with these agents it does not require what is considered as an *overdose* to do mischief in some instances. Idiosyncrasy and peculiar susceptibility of individuals, as also special states of the system, are circumstances that occasion the mischief, and hence the greater importance of thorough study on this subject.

For the consideration of the special anæsthetics, place is assigned among the Poisons.

AMENABILITY IN SURGERY.

CHAPTER II.

PROSECUTIONS for malpractice are far more common in surgery than in medicine, since the evidences are so much more ocular. An ill-shapen limb or physical deformity of any kind, or a defect of any of the physical senses, seldom fails of being noticed; and the inquiry is very natural, "How came it so?" The very same amount of malpractice in the line of medicine may be overlooked, since the causes are less readily suspected.

The inquisitiveness characteristic more especially of the American in regard to causes of physical defects is well illustrated in a common anecdote related of the Yankee who, on noticing the defect of a man's hand in the loss of a finger, inquired as to the cause of the accident, and was told that the answer would be given on condition that no other question should thence follow. Assent was given, but yet, when informed that the finger was *bitten* off, his curiosity became so great that his promise of a stop to interrogatories could only be maintained by half; for the half-suppressed and side utterance came, "I *would* plagued well like to know what *bit off that finger!*"

This curiosity, so characteristic, has done its part to reveal many instances of malpractice in surgery.

It must be a conceded point that all men who offer their services to the public as surgeons, as well as practitioners in every other department of the profession, ought to be fully competent to perform what they profess; and a liability to prosecution for damages is the only ready

way to keep matters right on this score. The greatest motive for prosecution for malpractice, perhaps, is found in an inordinate *cupidity*; the word *inordinate* is here used, as it would seem that the meanness of *ordinary* avarice would hardly come to such a result.

On trials in suits for surgical malpractice, much attention is given by the attorney for the prosecution—if he is well informed—to the extent of the defendant's deficiency in knowledge of anatomy. This is notable, and often found to be in excess even of the attention given to surgery itself. The practicing surgeon may as well bear this in mind—especially such as attempt surgery on a small stock of anatomical knowledge.

WOUNDS AND PERSONAL INJURIES.

As the subject of wounds in their various kinds is treated of, as concerned in expert testimony, where more appropriate, it is only necessary here to note a few particulars in which surgeons are most liable to be in fault, and hence suffer by a prosecution.

If a case in surgery relating to wounds be so unskillfully treated as that injuries more or less serious follow in consequence of such treatment, there will be ground for a suit for damages.

Wounds have diverse causes of danger: *First*, a vital organ may be so disabled as to occasion danger immediate or consequential; *secondly*, there may be danger from loss of blood by lesion of vessels. This danger may be from the exhaustion occasioned, or by the extravasation.

The surgeon must be so thoroughly acquainted with all the possible causes of danger as to enable him to meet the case with such promptitude as is always necessary in this class of injuries. Of course, in casualties of this order, there is no rule by which the surgeon can know

just what the nature of the lesion may be, except from physical appearances. He must have anatomical skill, as well as surgical aptness. He must have physiological knowledge to judge what disabilities exist. He must have mechanical ingenuity to enable him to reduce or close up lesions, and adapt the parts thereto by the removal of intruded and disintegrated parts. He must know how to arrest hemorrhages, either by ligatures or otherwise; and, what is a very important matter, he must know what immediate appliances are necessary to sustain life in very severe injuries while the surgical processes are going on.

The surgeon's responsibility is great in some cases of this class, although in most cases less so than is commonly supposed, if proper and timely skill be put in service; because the real danger can, by such attention, be usually known, and the liabilities thus avoided. One thing is in favor of the surgeon here. There is such a universal horror attendant on such accidents that the worst is ever looked for, and the surgeon inherits less blame oftentimes than he really deserves. The common sense is not nice about questions of extent of injuries. In hearing of such injuries, the question that comes up is whether *killed* or *not*? So, therefore, when serious results follow, the account is put to the accident, and the surgeon escapes. Still, the surgeon has other considerations in the case than merely the question of blame—he has *moral* grounds for solicitude; *humanity* has its claim.

DISLOCATIONS.

Except when the spinal column is involved, dislocations are not usually fatal injuries. Yet there is no surgical performance in which the operator is more liable to be the subject of a prosecution for damages. There is

no case other than such in which (on witnessing a crippled attitude) the question of proper surgical treatment more naturally comes up. Unlike the cases of open wounds, where the blood flows, and the gaping wound horrifies and diverts ideas of blameworthiness from the surgeon, here nothing is seen but change of shape, and the natural sense is that the proper shape should be immediately restored. If the surgeon fails to do this, he is subjected to blame. If serious results follow, then the idea is very apt to come of making the surgeon bear the responsibility; and this is usually graded with the character of the patient—as to wealth and social position. Thus the *surgeon* has a somewhat different position in the matter of a patient's character from that of the simple *medical practitioner*, of whom it is usually stated that he prefers *rich* patients.

One of the greatest difficulties in cases of dislocations, especially when not of very recent occurrence, is the attendant swelling or tumefaction, which obscures the diagnosis. The liabilities here are in the confounding of the dislocations with fractures or simple sprains. From fractures the detection is by the absence of crepitation in moving the parts.

The diagnosis is to be found elsewhere, and brevity here is greatly to be desired.

The fault in adjustments of dislocations is usually in wrong *leverage*. No surgical operation is so completely conditioned for successful manipulation upon a thorough anatomical knowledge as the treatment of dislocations.

FRACTURES.

Fractures of bones are cases more alarming to the popular sense than dislocations, and the disposition is less apt for seeking for damages in instances of unfor-

tunate or culpable proceedings. Still, the dockets of the courts are not without a considerable number of such cases on record in this country and in Europe.

No statement can be made as to the causes most apt to lead to unfortunate results. Lack of surgical skill is perhaps the most frequent. This lack is more common as regards the adjustment of the appliances—that is, the means of keeping the injured parts free from damaging motion. Common sense here, in reducing fractures, fares better without anatomical knowledge than in reducing dislocations. Good reasoning will suggest as to how the parts ought to be posited. The tension in reducing fractures is ever more simple in application. The reverse, however, obtains in matter of maintaining the adjustments. A reduced dislocation is much less apt to be disarranged than one of fracture, because the bones afford protection against muscular tension; while in the latter, the broken bone has lost its resistance, and muscular contraction is apt to distort the parts.

In fractures, it is ever important to give attention to the extent of the injury—whether it is simple or compound, and whether it be complicated with lacerations.

The removal of intruded or broken portions of bone, when openings afford the opportunity, should not be neglected, since it is known that portions entirely dis-severed are causes of serious obstruction to the healing process. They do reunite sometimes where the injuries are simple, but in complicated states seldom, and they occasion suppurations for discharges.

AMPUTATIONS.

Seldom is it that liabilities for damages occur in amputations, unless, indeed, there is great lack of skill. Little needs to be stated in way of precaution. The surgeon

should understand his business, of course, and should be reasonably prudent about undertakings. Amputations are much more liable to be unnecessarily performed than they are in danger of being neglected. Surgeons seem to have a proclivity in this direction. Especially is this the case in army hospitals.

EXCISIONS.

Operations for extractions of tumors are very common performances; and in surgery of this character there are only two particulars that require here any notation: *First*, in regard to diagnosis; it is a bad thing for a surgeon to run his knife into an aneurism in the expectation of letting a body of pus escape. *Secondly*, it is of importance in excisions that the surgeon should be a good anatomist. He should ever know where there is danger in the use of the knife.

Operations of this character, when of the graver sort, and in proximity of vessels that give danger of hemorrhages, ought to be premised by provision of the proper appliances for arresting the flow of blood.

Other operations of the graver sort, as for lithotomy, ovariectomy, etc., ought never to be attempted without consultations and assistance from and with fully competent persons. They are, indeed, not more difficult as to the principles involved; but they produce more constitutional disturbances, and are less certain of successful performance.

AMENABILITY IN OBSTETRICS.

CHAPTER III.

ALTHOUGH there is perhaps more malpractice in obstetrics than in any other professional service of the physician, yet there is not the same apparent liability to prosecutions. This, doubtless, is because the exclusive character of the occasions of its practice prevents publicity to the blunders and mischiefs that are perpetrated in the parturient chamber. Even when the facts are known, the natural feelings of modesty and retirement from public discussion saves many an awkward practitioner from trouble.

The inevitable result of this occasions less care and time to be taken for proper qualifications, on the part of the physician, in many instances.

It is gratifying, on the other hand, to know that the profession has in its ranks a large proportion of most honorable, prudent and conscientious members—men whose souls feel the impulses of a noble philanthropy and humanity.

When a case of malpractice is clear and evident, however, the courts and juries are severe. This is most natural. So, also, the poor, helpless sufferer, excluded from the help of those who might otherwise afford her relief, and who has endured the tortures of the manipulations of the unskilled and self-assured attendant (who, under the name of the noble profession, gains entrance to practice), now effects a most appropriate meeting out of justice in its *fullest* requirement.

The liabilities in obstetrical practice are occasioned mostly on mistakes in matter of presentations and of wrong methods of proceeding in such cases. The use of instruments also involves not a little liability of doing injury to such an extent as to subject the awkward accoucheur to prosecution.

DIAGNOSIS.

The mistakes in the diagnosis of pregnancy arise from the difficulty of distinguishing it from ascites, ovarian tumor and distension from amenorrhœa. But skill on the part of the physician will usually suffice to prevent serious mistakes.

The diagnosis in matter of presentation is sometimes a little difficult in the early stage of parturient labors, and officiousness, arising from impatience on account of the inexperience of the attendant, has been known to occasion serious results — retardation of labor and convulsions having ensued.

DELIVERY.

The mischiefs that occasion trouble that may result in prosecutions for acts in delivery mostly involve the improper use of instruments. Serious lacerations, wounds and rupture, even, of the uterus, have been perpetrated by the awkward use of obstetrical and even other kinds of instruments in attempts to promote parturition. In such cases convulsions and death have ensued.

Imprudent hastening of delivery, thus occasioning hemorrhage, has been followed by serious results, and such practice is reprehensible.

Improper force exerted by the accoucheur, by which the uterus has been inverted, with serious results, is a course actionable for damages.

The use of improper or excessive doses of drugs to promote delivery is reprehensible, and must be avoided, since many serious results are known to have ensued from their use in this manner.

Neglect in securing the funis from an escape of blood, and consequent death of the child, is ground for a prosecution.

The violent removal of the placenta has been followed by hemorrhage and death, and is reprehensible.

CHILD-BED.

Neglect in after treatment of mother or child, when dependence is placed on such attention, is actionable. Puerperal fever, convulsions and death have been traced to such neglect; also hemorrhage, erysipelas, hysteritis, peritonitis and other bad consequences that could not admit of a mistake, but as resulting from neglect of attention to symptoms, have been proven. All such instances are to be avoided by the careful and prudent attention of the accoucheur.

ABORTION.

The laws relating to abortion are now strict in this country and Europe. *Criminality* attaches to every intent for its procurement, except that for the safety of the life of the mother, and which occasion is extremely unfrequent. No cause but malformation of the pelvis is commonly recognized as sufficient to justify the act.

The inducements sometimes offered to physicians are very great; and although Professor Taylor, in his "Medical Jurisprudence," expressed himself in complimentary words of the moral integrity of the profession, yet he admits that the proofs are too numerous to doubt the

fact that many physicians, in this particular, yield to mercenary motives.

Criminal abortion has its practice mostly between the fourth and fifth months of gestation. This is because about that time pregnancy begins to be more definitely suspected, and the act, being dreaded, is not perpetrated until the evidence thereof is made more apparent.

The means of procuring abortions are mainly of two kinds—mechanical and by the use of drugs. The first have their direct and specific mode in the rupture of the membranes by puncture through the os tincæ.

The procuring of abortion is not without danger to the health, and *life* also, of the subject of the operation. It is unnatural, and the connection of the embryo with the parent is too intimate and important to admit of severance without occasioning considerable disturbance to the physiological functions. Inflammation of the womb and of the peritoneum is liable to set in, and often terminates seriously. The peculiar sympathy between the uterus and the entire system is such that notable constitutional disturbance is apt to ensue upon the occurrence of an abortion. After taking place once or twice, it will dispose the person to a greater liability of its recurrence afterward. It is at the period of the former catamenial that the liability is greatest. Observers have noted as a fact that in pregnancy this lunar period is somewhat critical. Many women suffer peculiar sensations monthly during gestation. Those who practice the business of procuring abortions take note of this and set their time accordingly.

Aside from all moral and social considerations, this act is extremely reprehensible, as it entails constitutional injuries, and doubtless has effected *permanent* entailments. This, as a cause of much suffering among women, may not be suspected, but it doubtless obtains as a factor to many ruined constitutions.

The physician should lay it down as a rule that, as the procuring of abortion is a *crime*, it must ever be so treated. He should be aware that lawyers are possessed of a knowledge of the same facts in regard to abortion—in the characteristic symptoms thereof—that the physician possesses, and that the hiding of the crime is not always successful. Nor is this means of detection the most common one. Many intelligent women are aware of the signs by which abortion may be detected, and the criminality of the act fixes the attention. “Murder will out” is a notion that seems to have a proof in the facts of history. The medical man ought from this, if from no higher motive, to keep himself clear of this crime.

The drugs that are commonly employed to effect this dastardly object are powerful emmenagogues, or ecbolics, such as ergot, oil of savin, black hellebore, macrotrys, podophyllum, rue, aloes, mercury, sulphates of iron, copper, lead, etc. The emmenagogue power is promoted by use of drastic purgatives, in connection or following.

But the reference to abortion in this connection is not intended to relate to the criminal aspect of the case alone; it is the matter of a liability of the physician to be held responsible for failures in preventing, or for maltreatment of, accidental abortions.

Little can be done to neutralize the effects of drugs used as abortive agencies, except the quieting of irritation and supporting the constitution.

It has already been noted that the process of abortion or premature expulsion of the embryo is an unnatural one, and now, speaking of the means to effect the object, it is to be observed that they require to be unnatural, also. A moment's reflection will prove this; for, whether they be mechanical or potential, they are in this effect unnatural. The practice in the use of such means for such purpose can not but involve much responsibility.

It would seem hardly necessary to state that resorting to abortion as a means for relief from a prospective danger to life, and which is the usual innocent motive for such procedure, should never be adopted without first having consultation, so as to insure safety, both as to questions of immediate propriety and as a means of dividing the responsibility. A physician of joint attendance may become a good witness for a defense in case of possible trouble. The facts should also be well explained to the patient herself, and to her friends, and thus an additional sharing of the responsibility is secured.

The ready manner in which some practitioners come to their conclusions of the necessity of a resort to abortion as a means of relief, or as a preventative of trouble at maturity, is reprehensible in a high degree. And if a criticism is urged against the position here taken, then let the critic ask himself if he can find in all his researches a single natural remedy, or rather therapeutic agent, that has a natural indication as an abortive for curative efficacy!

It must be laid down as a principle ever to be maintained, that abortion should never be resorted to except to protect the prospective mother from danger of death or ruined constitution, and in this case it is surely only the lesser evil.

A *resume* may here be made thus: Procuring abortion, either mechanically or by abortive medical agents, is ever a dangerous proceeding—never justifiable, except when natural birth is impracticable, owing to malformations or other physical disabilities, and which are all of extremely rare occurrence. When necessary the practitioner should first hold a consultation to divide the responsibility.

PROFESSIONAL TESTIMONY.

A VERY brief citation has now ended, in which the main exposures to prosecutions for malpractice are found. The medical profession in this country is now so far progressed in professional culture, and the general availments of the kindred sciences are of such good service now among medical practitioners—while, also, the moral status is so notably elevated—that *precautions* are really almost obsolete. Perhaps, with this sense, it might be considered that an apology is due for stating *anything* for the personal defense of the physician at all. This, however, is not uttered here because several of the standard works on Medical Jurisprudence do not contain anything relating to the personal liability of the medical practitioner on account of his own practice—since their reason for the omission is in the fact that the works (alluded to) are almost exclusively intended for persons devoted to the law as a profession. Therefore, what is written in the present work is the more necessary, not only because this is intended for both medical and law students, but because, in sooth, this *alone*, of late works, has this service supplied.

Now, therefore, the main object of the work comes into consideration. *Professional or expert testimony* is a very important part of the physician's service to the community, as also to the state. It is, hence, necessary that the various matters that are brought forward in courts of law and in coroners' inquests should be discussed in

their relative importance in a work of this kind. Since other medical and law books have what they do contain on the subjects in such a diffused order, and since a concise or systematic order of them is thus out of the question, a work concise and yet thoroughly reliable on medical testimony is in real demand.

Systematizing in such a work as this is difficult, since the subject matters are heterogeneous, and therefore the effort will be comprehensiveness at the expense of system. Like as in the former brief articles, the headings will be abrupt, and the facts will at once be ushered in as concisely as possible, but yet at greater painstaking than was the case in the preceding.

CORONERS' INQUESTS.

These courts have not happened to secure the respect and attention of the public that their object justifies. Our inquests in America are the equivalent of the old English Courts of Assize, as still continued in Scotland, which has one of its duties to investigate the causes of sudden deaths. The word coroner, now implying the office of one whose duty it is to hold inquests over the bodies of persons suddenly deceased—like that of assize—originally had a very different designation. Perhaps, if the original meaning of its functions were still persisted in, the occasion of its service would be more respected, since the coroner was at first, in England, the Lord Chief Justice of the Queen's Bench, whose main functions were those that concerned the questions that most immediately concerned the sovereign.

At present, in England, the coroner, under the law of the "Medical Witness Act" of William IV, has the authority to issue an order for the presence of any medical practitioner in the vicinity to examine the body

in any case of sudden death, and then give testimony as to the cause of the death. And this is the intent and function of the coroner's office in our country, only that these inquests usually do not demand well-informed witnesses, but bring into service any convenient persons. Still the physician is liable to be called up.

The question comes now, whether the physician is bound by law to obey the requisition thus made? and, if so, whether he is entitled to a professional fee? The answer is, that in England the practicing physician, if called upon formally, is bound to attend if his fee is tendered him. But, unfortunately, the fee is not very definite—whether it be only that of a commoner, or that of a professional man, the regulations not being uniform. The penalty for disobedience is five pounds, unless a reasonable excuse can be assigned for non-attendance. The professional fee for a post-mortem examination is two guineas. In America the states mostly have about the same order of things in like cases. Generally the physician can be excused from attendance if he be very busy, the dead not having an equal claim on this functionary to that of the living; still the physician, if prepared to conduct a post-mortem examination—which he should ever be—ought to answer such a call if he can.

TESTIMONY IN COURT.

There are, perhaps, no events in the professional life of either the physician or the lawyer that are as likely to give foundation for a wide reputation as the giving of *expert testimony*. Here the two professions, of medicine and law, have their arena; and many a great battle has been fought and skill and tact exhibited that finds no other occasion for so notable a display. Here professional reputations may be made or lost in a very brief period

that might otherwise never come to note in a whole lifetime. There is, perhaps, little difference in the chances between the lawyer and the doctor for the making of reputation, and the scenes at court are often the occasions of much interest from the extent of these displays of talent and professional expertness, though it must be confessed that professional duties are not in highest service in these gladiatorial combats.

There are various important preliminaries to be considered before the discussion of expert testimony comes properly to hand.

OBSERVATION: Some physicians have been known to treat Medical Jurisprudence as a superfluous study, and have affected to believe that any competent practitioner, possessing ordinary good sense, can go into a court and successfully give testimony in the face of any lawyer—who are casually presumed not to know much about medical subjects, and are not likely to occasion embarrassment to a physician in giving testimony. But, this notion is a delusion, for it is quite as much in order that the lawyer should be thoroughly informed in all matters of the medical profession that relate to law as it is that the physician should be thus informed.

Instances are not unfrequent when very amusing things are witnessed in these particulars. A case is in the memory of the author where not a little merriment occurred in the testimony of a physician. He was a notable man in the profession, possessed a good general education, and had a high position in society. His large personal experience and the respect held for him as a medical man gave him a feeling of indifference, and he went into court with an air of assurance that showed plainly that he expected to dispose of matters placed before him in a commanding manner. He was profuse in the use of professional terms and "*learned phrases.*" The

opposing lawyer was one of most thorough acquaintance with Medical Jurisprudence. He let the medical man proceed in his fluent style until he was through with the direct testimony, which had been led on by the state's attorney. Then he began to traverse the testimony. The question was put to the witness as to whether he was well acquainted with the subject of Medical Jurisprudence. The answer was, that he considered himself to possess a good medical education, and that he was not without considerable experience. The lawyer then proceeded to a thorough criticism of the testimony, showing many inconsistencies and not a few strictly professional contradictions, and, going on with a scathing cross-examination, surprised, confused and bewildered the doctor to such an extent that he broke down completely, and acknowledged in open court that he had never studied Medical Jurisprudence, and was not capable of giving connected testimony in such a case. The physician afterward seemed never to evince his former assuring manner in society. His want of forensic knowledge was a sad misfortune to him. Indeed, he really quit the practice of his profession soon afterward.

No questions in court are so likely to engross the attention of a community as those of Medical Jurisprudence. Always, such cases that come into court are of much importance, and many are criminal and capital cases. Family connections, on both sides, occasion a wider range of public interest than mere curiosity and sentiment would afford. Oftimes the cases involve persons of high position, as in the case of the late President Garfield. The expertness of the lawyers and the doctors alike in that case obtained world-wide notoriety. The people of all nations read daily the history of the proceedings of that great trial.

The matter of fees, also, is one of some consideration, besides the patronage that is thus secured by superior expert abilities.

Character of Medical Testimony.

It must be obvious that the testimony of a medical man called into court involves important contradistinctions; for, besides the *expert* testimony, a physician is liable to be called upon to give testimony in matters of *fact only*. Thus, he may be summoned into the presence of a coroner in an inquest, and here he may need only to testify of what he knows about the *facts* concerning a death that had occurred. Then, subsequently, he may be called upon to appear in court for expert testimony in the same case. In this latter case, he has nothing to testify of the facts in the case, but his professional skill and judgment are now brought into requisition. He does not now state the events of the tragedy; but he is called upon to state, on the facts now placed before him in other than his present testimony, whether given causes were sufficient to produce the result stated. Here, now, his professional competency is being tested. A physician may be disgraced by the first question put to him. Thus, it may be asked of him: Have you ever made Medical Jurisprudence a matter of study? Have such questions as those now pertinent ever come before you? Do you understand the nature of such a case? If he can not answer in the affirmative to these questions, he is *dismissed* at once.

Obligation to Obey a Subpœna.

The question is a very important one to know, whether the physician, who has the important duties he owes to his patrons upon him, is bound to obey a subpœna to

appear in court. It would be very fortunate if this question could be at once satisfactorily answered; but this is not the case. Various investigations have been made, and these by high authorities of this country and Europe, which, unfortunately, fail entirely to afford a solution. The decisions have been various and contradictory. It may be said, however, that in the United States the rights of the medical profession are better protected than they are generally in England.

Lord Campbell gave a dictatum (*Betts v. Clifford*) that has been regarded as an advance toward the settlement of the question in England. He afforded a compromise between the two professions, thus: he makes a distinction in the character of the evidence sought to be given, and distinguishes in the grounds of liability, respectively, as to whether the testimony is that of *fact* or *opinion*—the latter being what is designated as *expert* testimony. A court may demand the appearance of a physician and compel him to testify, if subpoenaed, on all questions of *fact*; but, as his knowledge of matters of science is his own property, the use of this can not be forced from him.

But, unhappily, it appeared in some subsequent trials that it is quite difficult to distinguish many questions of fact from those of opinion; and so his lordship's decision, after all, did not settle the matter fully. An instance may be suggested in which the equivocal character of a case is apparent. We will suppose a case of poisoning to be in court, and the expert testimony of some eminent medical man may be desired, and, to obtain it, the attempt be made to shape his testimony into questions of fact, by first beguiling him into a service that converts his scientific availments into practical fact character. The stomach of the subject is sent to him for analytical investigation, and he analyzes it. Now, he being put

into possession of a knowledge of *facts* concerning the case, the testimony will hence be of these facts, although it is his skill and judgment that have been made available, and the testimony can be demanded.

The English decisions regarding the necessity of obedience to the subpœna have illustrations in various recorded cases. We have that already alluded to of Lord Campbell in *Betts v. Clifford*, *Warwick Assizes*, 1858; Justice Maule, in *Webb v. Page*, *Carrington's and Kirwin's Reports*, p. 23. These sustain Lord Campbell's decision. But in the Court of Exchequer, May, 1868 (*Maxwell v. Morris*), the Chief Baron decided that a failure, in all cases, of obedience to a subpœna is a case of contempt, and is punishable by fine and imprisonment. Piggott Baron and Martin Baron are in unison on the matter. Thus, the decisions of the English Courts of Exchequer and Assizes are in conflict. The Court of Queen's Bench is equivocal, and the precedents are not uniform. This court, as also that of exchequer, allows physicians small extra fees for services.

Nor are the American courts any more in agreement with each other. Professor Reese, the American editor of "Taylor's Medical Jurisprudence," states that he employed a legal gentleman to look up for him the laws of the United States in relation to the fees of medical experts, and only two decisions were found on the matter, and those were in direct opposition, the one to the other. One of these was *ex parte Dement*, 53 *Ala.*, 189; the other, *Buchman v. State*, 59 *Ind.*, 1. This latter conceded the right of the physician demanding a professional fee (not stated how much), and, on refusal, a failure to obey the subpœna is no contempt of court. This latter decision has been corroborated by others that might be noticed, as *Blythe v. State*, 4 *Ind.*, 525, and *Dills v. State*, 59 *Ind.*

Hence, it may be assumed that medical men in this country may demand a professional fee (how much?) as a condition of obeying a subpoena.

The Medical Man in Court.

The demeanor of the physician in court will go far to determine the measure of respect he will receive for his professional character. Kindliness begets kindliness. Candor and respectful dignity afford the best immunity against offensive treatment. There is a wide license allowed to lawyers in examinations of witnesses. The witness is sworn to tell the *whole* truth, and the lawyer takes, ordinarily, advantage of this—his opportunity.

Retaining Professional Secrets.

It has been supposed that a physician can hold inviolate the facts and secrets confided to him by his patients in giving testimony. But this is not entirely, nor even considerably, true. The courts proceed on the assumption that the safety of the state and the good of society demand that a witness giving testimony in court, under an oath requiring him to tell the *whole truth*, allows no reserve. There is, however, one point that may be borne in mind—that a witness may hold from uttering *voluntarily* what he believes to be wrong to state. No one's duties are in conflict, and it is a man's duty to do right. But, if a question be put to him specifically, the ruling of the courts is that such question must be answered. In an English court, in a case involving the Duchess of Kensington, a witness declining to answer a question on the ground of professional confidence was ordered by the judge to proceed.

Again, it is sometimes supposed that *medical secrets* are inviolable in court. But this is not the case. The courts

properly declare that no truths of public good that are matters of science can be withheld in court. Forensic medicine recognizes no secrets when justice makes demand. There is only one condition in this particular: it exempts any one from criminating himself. No one is bound to give testimony against himself. An amusing incident is recorded by Dr. Taylor, in which the medical witness, in a cross-examination, was asked what antidote he first used in the case, and the witness, being irritated by the question, and declining to answer, appealed to the court. The reply was that he must answer, unless he had reason to believe that his antidote killed the deceased. "In that case," says the judge, "you are not bound to answer." The question was immediately answered.

SUBJECTS IN EVIDENCE.

EXPERT evidence runs over a large scope of subjects, though they mostly relate to questions of crime. Besides matters of a criminal nature, there are those that concern Wills, Descent, Sanity, Insurance, Liability to Military Duty, etc. The medical man, in all these cases, is of much service to the state and to individuals.

DEATH AS A SUBJECT OF TESTIMONY.

CHAPTER IV.

SIGNS OF DEATH.

FORENSIC testimony has much concern with the signs of death—that is, the proof that death has actually taken place, the length of time since its occurrence and the method of its perpetration.

The following are the most notable signs of death: Cessation of respiration, stoppage of pulse, insensibility, cooling of the body, rigidity, change of appearance of the eyes, change of appearance of the skin, coagulation of the blood, ecchymosis, mortification, adipocere.

CESSATION OF RESPIRATION: This sign of death is of a character too obvious to require much to be stated. Still, taken alone, it is not a sure sign of death. Again, it

is to be noted, that in a temporary stop to respiration, as in syncope and sudden emotions, as fright, there is often an interruption to breathing temporarily. And more permanent in catalepsy and hysteria. In the absence of other signs of death, this alone is ever held in suspense as to its indicating positive death.

Tests: Moisture on a looking-glass, held before the mouth and nose, will indicate breathing even when not detected by the eye otherwise.

A feather, down, or spider web, held to the nose and mouth, may indicate breathing by the motion.

Placing a bottle of mercury or of water upon the chest will afford ready means of detecting the motion of the chest necessary to breathing. When respiration is the point in question, these three tests are those most commonly put in requisition by experts when called to examine a body suspected as dead.

This sign of death—the stoppage of respiration—must be fully tested, and must be determined to be permanent or persistent.

Voluntary suspension of respiration can seldom deceive any one, as it is certain that respiration is only partially under the control of the will. One may hold his breath readily for half a minute, and some can sustain the suspension voluntarily for a whole minute or more; but no one can permanently, by force of will, occasion death.

Accidental suspension of breath may continue two or two and a half minutes, and resuscitation follow spontaneously. But the avails of skill have gone much farther—even to the extent of fifteen minutes or longer suspension before resuscitation.

STOPPAGE OF PULSATION: This, as a sign of death, is very similar to that of the stoppage of respiration, the two functions being of mutual dependence; still, it is known that the action of the heart and arteries may continue for some little time after respiration ceases.

Care is necessary in the examination, as the impression of the pulse throb is not always to be relied on. The throb may not be apparent in one part of the body, and yet in another it may at the same time be detected. In cases of cholera, abdominal collapse, a violent shock of the nerves, may also arrest the pulse for a space of time, while yet the subject may not be dead.

By the application of the ear over the region of the heart, or, still better, by use of the stethoscope, the sound of the heart may be detected when the pulse at the wrist, temples, neck and other arterial exposures may fail to be perceived. The sound, which may be expressed by the words *lūbb-dūp*, *lūbb-dūp*, is well recognized by the ear. The first (*lūbb*) is made by the contraction of the ventricles (*systolic*); the second (*dūp*), which is of slightly longer continuance and of slightly lower pitch, is coincident with the closure of the semi-lunar valves (*diastolic*). These pairs of sounds have an interval between their occurrence in elderly persons of about one second, and in children of half a second. But they are variable, also, in different persons, owing to constitutional differences.

Diseases of the heart may also effect the sound of the organ in action. The throb of the heart and that of the arteries are simultaneous, being made by the same muscular contraction.

As in the case of the suspension of the respiration, it must be proved that the state is permanent, and not temporary only.

Anomalies must also be taken into account, for there are many records of very extraordinary suspensions of the action of the heart. And first, the author must place an additional case on record—one of very extraordinary character: A young lady fell into a state of catalepsy in a religious meeting, where there was much religious emotion, and she remained in this state six days and

seven nights continuously. All usual signs of life were extinct; no pulse to be detected anywhere, nor respiration; the body was cold and rigid; sensation of every kind entirely lost. Very severe tests had been made by violence upon the skin and pressure or contusion upon naturally sensitive parts, as also the effect of irritants in the eyes, mouth and on the skin produced no evidence of sensation whatever. The skin became jaundiced, and ultimately dark yellow.

The recovery of this case was very slow. The first signs were very faint, and pulsation so slight at first as for a while to occasion doubt of its recurrence by some observers, while others attested it. The lady had been pronounced dead by many physicians, and almost all others, and would have been buried but for the interference of the author. Great caution is necessary in pronouncing in all cases of suspended animation from mental emotions, especially if from religious impressions.

A case is recorded in the "Medical Times and Gazette," 1863, where symptoms of death occurred from abnormal sleep.

One in "Edinburgh Journal," 1845, of same character.

In "London Medical Record," 1875, an extraordinary case that was taken to the Cochine Hospital of Paris, France, is recorded, of somewhat similar character to the first above recorded case.

And in the British medical journals, from 1870 to 1880, there are several scores of cases of similar character recorded.

INSENSIBILITY: As a sign, insensibility is not reliable, taken alone. There is so much of it in palsy and other diseases, where death is not present, that care is to be observed in pronouncing on this evidence.

Tests of Insensibility: The application of heat to the skin, as by dropping melted sealing-wax upon it, the

flame of a lamp, a piece of heated metal, or hot water, will afford a test. If a vesicle is produced containing albumen, and if redness about the margin is occasioned, there is evidence of the continuance of irritability—a sign of life. If the raised cuticle contains a clear, thin fluid—serum or water—this is no sign of life, as it is produced on simple mechanical principles.

Caustic applied to the skin will, in case of death, occasion no redness nor eschar, but leaves the skin transparent or yellow.

COOLING OF THE BODY: Many circumstances have to be taken into account in estimating this sign of death. That a dead body tends to cooling soon after death is the usual order of the case. But it is not absolute. There are instances in which there is a rise of temperature soon after death. This is of chemical effect. The diseases after which instances of this character are to be noted, are: yellow fever, cholera, Bright's disease, small-pox and some other putrefactive diseases. This post-mortem rise of temperature is sometimes very considerable, amounting to as much as nine degrees Fahrenheit.

The character of the causes of death, and the exposure of the body after death, must be taken into account. Usually it takes from ten to eighteen hours after death, if the body then be at say eighty degrees Fahrenheit, to bring it to the surrounding temperature.

Persons taking observations by means of feeling—simply by the sense of the hand—will note that, by the comparisons made with the surroundings, there is great difference in the sense of temperature in different objects. Woolen clothing does not indicate the real temperature of the air to our touch, as it does not conduct readily; but metal, earths and stone may. Adults cool less rapidly than children.

RIGIDITY AS A SIGN OF DEATH: In taking account of this sign, several facts must be borne in mind, because the state of the muscular contractility is characterized by three distinct stages:

First, in a short time after life is extinct the muscles become relaxed; this is noticeable by the dropping of the jaw, limberness of joints, relaxation of eyelids and softness of the muscles. During this stage (which is popularly called death) the muscles can be made to contract by electricity, by puncture, or by pinching. This is owing to what is scientifically called molecular life—that is, the principal *irritability* remains in the molecules of the muscular tissue for some time after functional life is extinct. This flaccid state of the muscles continues for several hours—usually about three, but in exceptional cases much longer.

The *second* stage is that denominated cadaveric rigidity (*rigor mortis*), which comes on after the muscular tissue fully dies—that is, after molecular death; then stiffness ensues pretty rapidly.

If the flaccidity of the cooling body has been considerable, then the stiffening that ensues may be taken as one of the most sure signs of death.

In the rigor mortis the limbs and all parts are disposed to hold the exact position that they occupy when this stage sets in. Hence, this sign is of value often in indicating the cause of death, and so is of no inconsiderable forensic account.

This stiffness is not affected by heat, light, air, water or other physical condition, as a law, although it be not always the same. There is a peculiar molecular cause, *i. e.*, as before stated, *molecular death*, and collapse occurs.

Post-mortem examinations have proven that the involuntary muscles become rigid sooner than the volun-

tary. Thus the heart is found to be collapsed ever in advance of the limbs. This has led some observers into mistakes in diagnosis, being mistaken for evidence of cardiac hypertrophy.

From the time of the beginning of the rigidity it takes from one to two hours for its completion.

Niderkorn, a German observer, always accredited for exactness, has given the following table showing the advent of rigor mortis in 113 cases, as indicated by the stiffness of the limbs:

From time of death rigidity was complete—

In two cases, at two hours.

In fourteen cases, at three hours.

In thirty-one cases, at four hours.

In fourteen cases, at five hours.

In twenty cases, at six hours.

In eleven cases, at seven hours.

In seven cases, at eight hours.

In four cases, at nine hours.

In seven cases, at ten hours.

In one case, at eleven hours.

In two cases, at thirteen hours.

The *third* stage of cadaveric rigidity is that which ends it, and when mortification sets in. The duration of the entire condition of stiffness is noted by Taylor in his "Medical Jurisprudence" as being from sixteen to twenty hours. But Tidy, a later English author, sets the time as longer, making it in summer from twenty-four to thirty-six hours, and in winter from thirty-six to forty-eight hours.

In this country the variation of the time of the continuance is greater than in England, as the difference in the range of temperature, summer and winter, is greater.

In young persons the stiffness is less; in old, greater than in middle age. Fleishy bodies are more stiffened than others.

The third stage, or mortification, is readily known by the offensiveness of the escaping gases, which consist mostly of compounds of sulphur, phosphorus and nitrogen. With this cadaveric smell there is to be noted the change of color that comes on about the eyes, neck and region of the bowels.

Mortification is the *surest* of all signs of death.

CHANGE OF APPEARANCE OF THE EYES: This is a striking sign of death. Perhaps, however, more notable because the attention of those about the dying is more apt to be to the face. Still, it is one of the early signs of death, for soon after breathing stops the pupils of the eyes change their expression; the iris becomes insensible to light; the cornea loses its transparency; the lids of the eyes drop; the conjunctiva changes first to gray, then black color; the eyeballs collapse and sink into the sockets.

But in several of these signs there must be borne in mind the fact that during life these may be produced in all appearances; this applies particularly to the appearance of the eyeballs and iris. The effects of poisons, such as atropine, Calabar bean, duboisin, etc., and, upon the lids, morphine and alcohol, are similar.

CHANGE IN APPEARANCE OF THE SKIN: The skin, soon after dissolution, turns pale. "*Pale as death*" is a common expression. With the pallid appearance there is also a degree of translucency, or a waxy appearance. The skin is also entirely without elasticity. Its discoloration that follows will be noted under ecchymosis.

COAGULATION AND ECCHYMOSIS: After death the blood in the vessels is found to be coagulated, as a general thing, though this is no reliable sign, as some cases of undoubted death will, when the vessels are opened, bleed freely. Coagulation is the dead state of the blood, and when this state exists the proof is good. But it is not

certain that the person is not dead because the blood remains liquid. It has been stated that the blood will not coagulate in persons that are killed by lightning. But Professor Taylor, in his "Medical Jurisprudence," pronounces this to be a mistake.

Ecchymosis is generally present in appearances of discoloration of the skin, in patches, that may be yellow, green, blue, or purple and black. These discolorings have been pronounced as signs of mortification. Such, indeed, they may be, but they are by no means exclusively such. Even in the living body, and even in ordinary good health, such markings are by no means unfrequent on places that had been bruised or injured before. It occurs from extravasation of blood in the skin, which, when not fully absorbed, soon is liable to occasion this discoloration. In some works the post-mortem ecchymosis is distinguished from the ante-mortem by the term of suggillation (Henke), but the discrimination is not good. If the discolorations are attendant upon the cadaverous smell, preceded by the rigor mortis, then the ecchymosis may be a good corroborative evidence.

ADIPOCERE: This substance is formed by the action of lime or ammonia on the fat of dead bodies, and the knowledge of its character and production is of some forensic value. The chief point is in the question of *time* required for its formation. Proof of guilt in certain cases may thus be professionally effected when positive expert testimony bears on the case. Adipocere is a soap of an amorphous or cheese-like appearance, and is formed from the fatty tissues of dead bodies under circumstances that favor saponification. Burial or submergence in water greatly favors adipoceration. Slight traces of adipocere have been found in so short a period of time as one month. Six weeks time, however, is called a brief period

for the formation of any considerable amount of this material. Burial in dry, sandy or gravelly ground is a protection against this formation. A clay soil, in a warm country, is favorable to it. When the materials of the body furnish all the components of adipocere, it will usually be of a whiter appearance, and be *ammoniacal* adipocere. When lime water is present about the body, the yellow, or *lime*, adipocere is formed.

Four months' time will admit of a considerable change into this substance under favorable circumstances. And this being about a regular limit, the witness need not hesitate as to matter of time to give it as safe professional judgment. Any large amount of adipocere being present precludes the idea of the date being much less than this time.

Adipocere was first publicly noticed as the product of the grave from dead bodies in 1789, in a memoir of Fourcroy, before the French Academy of Science at Paris. Excavations in the Cimetière des Innocents revealed in deep deposits large masses of this material.

When in Dublin, Ireland, some years ago, the author saw in the museum of the University a body of adipocere in fossil form. It was produced from a keg of butter that had been buried many years ago. The President of the Royal Society of Dublin, who showed it to the observer, stated that it is supposed that the butter was buried during the scarcity of food that existed during the wars of Bruce. The keg that contained it was also in fossil state, but was yet intact, though seemingly as light as cork. If buried at the time thus supposed, it is now not far from 600 years old. But there have been later wars and equal scarcity of food during the last wars of the Irish nation with England, when, also, the armies were present for some time at the same locality (Kildare) where the

fossil butter was found. Still, it is uncertain how long adipocere may exist in fossil form. It is as likely to date from the time of Bruce as that of Cromwell, when the conquest of Ireland was completed.

IMMEDIATE CAUSES OF DEATH.

Medical Jurisprudence should comprise all such cases as come into courts in which critical investigations are made of causes and manner of death. These are so various, however, that only a few characteristic cases can readily be given here. But these will illustrate principles and afford formulas that will prove of good service. Some of the cases are such as may occur in what is called spontaneous effect; others follow violence. Great skill is necessary to afford reliable grounds for conclusions.

1. *SYNCOPE (Death beginning at the Heart)*: The normal action of the heart is conditioned on two special matters that concern the blood: there must be a sufficient quantity of blood, and this must be of a certain quality. If either of these fail, there will be *syncope*.

The first case may, and usually does, follow from hemorrhages or bleeding; the second from lack of respiration. The effect is the same: there is *fainting*. But other causes also obtain. There may be obstruction to the passage of the blood through the heart, and this will be equivalent to a loss of blood. There may be an interception in the process of the oxidation of the blood, and this will be the equal of the lack of respiration. Full breathing of gas free from oxygen, as hydrogen, or the breathing of a gas that holds oxygen in chemical union, as carbonic acid gas, will be the equivalent of an arrest of respiration, and the result is the same. In *syncope* the subject suddenly falls, and is unconscious. There may be no other cause of it than simply privation of air

in the lungs; so when this is restored all goes on right. But there may be organic obstruction to the circulation, and any effort to restore by lung inflation of the purest atmosphere will not suffice to a recovery from syncope. The medical expert must study these facts, and pathology affords him the help.

2. APNŒA—ASPHYXIA (*Death beginning at the Lungs*): The Greek roots of this term imply pulselessness, and such is really the condition. The cause is obstruction or failure in respiration. Hence, asphyxia and syncope differ only in the immediate cause of the lack in the blood. If syncope is occasioned by lack of quality in the blood, it is asphyxia; if in the quantity, it is syncope. Strangling or smothering is the real physical condition of asphyxia. The term apnœa is of the same meaning as the other, and perhaps more appropriate, at least etymologically, as it means stoppage of breathing. The effect of cutting off the air is simply the failure in the oxidation of the blood, and the heart, lacking its appropriate stimulus, stops its action, and the pulse ceases. Thus the effect is the same whether the cause is by simple obstruction of breathing, as by hanging, drowning or any other mechanical interference, or whether the material (gas) that is breathed lacks the presence of free oxygen. So death by asphyxia is really death by defect of blood, whatever be the cause.

The symptoms of asphyxia are prominently paleness, pulselessness and unconsciousness. In time there is coldness from extinction of life. But it is to be remarked that life does not become extinct as soon as the interference at the lungs occurs, for by the experiments of Brodie it is proved that life continues for a time. The heart continues to contract its muscles, even though the blood lacks the oxygen. But this is only for a little time.

It would seem, from the facts ascertained, that the real cause of functional cessation with the heart is the lack of nerve force, resulting from the cessation of circulation through the brain.

The medical witness will, with his knowledge of the functions of life, judge and testify that in both syncope and asphyxia the death may have ensued from natural causes when no evidence of violence can be detected. This is proper ground for his researches.

The heart should ever be examined, and it should be discovered that there is no organic obstruction to the circulation before it can be supposed evident that the cause is from without. Furthermore, the effect of an apoplexy may be death, and be the cause of all the symptoms that result from asphyxia. Dr. Abercrombie gives evidence that in cases of simple apoplexy the body has been found with no other sign than what might appear from asphyxia. Chevalier bears account also of cases of idiopathic asphyxia. Cases are not unfrequent also of death taking place without any apparent cause. Persons have been known to retire quietly to sleep, and to have been found dead in the morning, without the least signs even of a struggle. An instance has just occurred (within ten days, only a few squares from the place of this writing) of a very estimable lady, in a highly respectable family, who was the object of the fondest affections. In the evening she retired in usual health, and in the morning, not coming to the call for breakfast, she was approached and found lying in a natural position, with one hand under the head (a habit very common to her formerly), and was cold in death. The countenance was placid, and every sign of death, without either distress or struggle, had taken place. Persons have been seen, right in the presence of their company, to sink away quietly in death, without a sign of disorder previously. Such

cases have resulted from paralysis of the brain or spinal column, or otherwise of the heart. Paralysis is often found to evince premonitories, but not always. Dissections in such cases do not afford evidence of lesions, and the conclusion is unavoidable that paralysis of a vital organ has been the cause.

3. *COMA (Death beginning at the Head)*: This is a case of preternatural sleep. The usual signs of a very sound sleep are present. It may be snoring, or other evidence of profoundness of the phenomenon. In many cases such occurrences pass away, and the usual habits supervene. In others there may be, after a longer or shorter period, and various degrees of unconsciousness, an extinction of life. The pathology of such cases may, in part, be comprehended by reference to the condition of the body in its natural state requiring *sleep*. It is exhaustion of the excitability or nerve stimulus. Its recuperation becomes necessary by the rest or quiet of the other organs, except those of organic life. This proves sufficient for recuperation. Now, in coma, there is a more considerable exhaustion of the nerve excitability, and a deeper sleep accordingly ensues. When the exhaustion, from whatever cause, be very excessive, there is a failure of recuperation. It can but thus be perceived that the life properties of the nerves may die.

We thus sum up the various natural causes of syncope, asphyxia, apoplexy and coma, and place the characteristics side by side with similar results that are occasioned by violence, and then search for the signs of the immediate causes. Here may be named the more common natural causes: (1) Asphyxia from natural defects in the lungs; (2) asphyxia from natural obstructions of the heart (paralysis); (3) asphyxia from a lack in vital properties of the air; (4) asphyxia from cold or electrical causes.

Then, for syncope and coma, there may be named: (1) Paralysis of the brain or spinal cord; (2) syncope and coma from paralysis of the heart; (3) syncope and coma from violent mental emotion; (4) syncope and coma from death of the life endowments of other vital organs.

Now the summing up of some of the violent causes of syncope, asphyxia and coma, may be given annexed: (1) Drowning; (2) hanging (smothering by compression); (3) concussion of the brain; (4) excessive heat or cold; (5) electricity; (6) starvation or thirst; (7) loss of blood. Then, in examinations of the body, the signs of these severally may, with greater or less effort, be detected.

In all these particulars, the matter of poisoning has been left out of consideration as a cause of death, and its symptoms will be separately treated of.

In the matter of special symptoms of the above violent causes of death, some more extended attention is due under this head. In the case of death from cold, there is usually not much difficulty in detecting the signs. The frozen condition is a matter apparent enough, but it may be the case that the freezing occurred after death, and so signs of violence must be looked for. When death is not complete, the signs of freezing are to be known by the characteristic stupidity and indisposition to move, while, also, the extremities are more affected than the body. The signs of death from cold detected by post-mortem, as given by Brodie, are: congestion of the duramater, sinuses loaded with black blood, piamater congested and turgid, several ounces of serum in the ventricles of the brain, the abdominal viscera are all congested.

4. STARVATION (*Symptoms apparent in Death from*): Great emaciation, foetid odor exhaling from passages, eyes red and open, tongue dry, throat dry, stomach and intestines empty and contracted, gall-bladder bloated and full

with bile, and this fluid also diffused over the liver, stomach and intestines, *notably*: lungs withered, blood-vessels empty, other organs unchanged.

5. LIGHTNING (*Symptoms of Death by*): Body in various states of mangling, sometimes internally so while externally sound, sometimes a small opening through the skin, color of skin livid, and this in streaks of sometimes more reddish color, blood said to be always fluid, muscles relaxed, sometimes body scorched or burned. The pathology of death by lightning, besides the mechanical injury, is the extinction of the vital endowment, yet this seems not to be the cause universally, as the heart has been found to continue beating after the body was apparently dead.

6. BURNING (*Symptoms in cases of Death from*): It would seem superfluous to give noting of symptoms from this cause of death, if it were not for a concomitant circumstance; it is this, that while the fact of burning may afford no signs of guilt in the cause of death, yet the examination of the body may prove this to exist. It is by no means unfrequently the case that fire is only used to cover the proof of crime by the sign of accident. Instances are given in records where bodies, even badly disfigured by the fire, nevertheless admitted of the detection of other violence. Fodere mentions a case in which a murderer in France, who dispatched his victims by the use of an ax, then set fire to the house and fled. The charred remains were buried, but a suspicion, afterward arising, caused a disinterring and examination of the bodies, when it was discovered that the heads had been cloven by the edge of an ax. A case that occurred in Maryland some years ago was of a very similar character in the after act of burning; it had only a difference in the nature of the instrument of death, which was a poniard.

Bodies examined after burning under suspicious circumstances ought ever to be carefully inspected for signs of other causes of death. There is one particular more, proper to be noted in examination of burned bodies to ascertain if fire did injury before death or not—that is, if fire may have *occasioned* the death: If the skin on any part of the body is remaining, and there be blisters found in the skin, or if there be lines of redness encircling fire wounds, it is a case of burning, at least in part, before death. Burning on the dead body will produce no similar blisters, nor any redness around a wound.

One more specialty requires notice here in regard to the effects of fire on a human body: If the body be one of an individual much accustomed to alcoholic drinking—that is, of brandy, rum, gin or whisky—it will be found that fire is greatly more apt to occasion death, or, when preying upon a dead body of one having been so saturated with alcohol, it will burn with very much greater avidity. Bodies that had been reached by even a small fire, as from a tallow candle, have been found to be almost entirely consumed to ashes. It is not merely the amount of alcohol in the body that occasions its greater liability to combustion, but the solvent character of the chemical (as it really is) forms, with certain substances, *adipocere* of the body, a very combustible substance, which proves sufficient to burn it up. *Living* bodies have been known, under such circumstances, to take fire.

In proof of much of this, the names of many of the most eminent physicians in France, England and America might be here cited. Not less than fifty or more authentic proofs of such occurrences are given in the leading medical journals of France, Germany, England and America, but more need scarcely be said of it, as these facts are now so fully conceded.

Professor Beck, in his "Medical Jurisprudence," Vol. II, pp. 71, 72 and 73, 1838, enumerates, as within his own notes of record, twenty-six authenticated cases of this character as having occurred in Denmark, Italy, France, England and America, and he speaks of notings of others showing similar results. *Topers ought to be careful when they are near the fire!*

WOUNDS.

CHAPTER V.

INJURIES that are called *wounds* are so various that several separate chapters are required for full consideration. In this and the ensuing one, general principles will alone be considered.

It is not simply the question to be decided in this cause of death whether the *wound* was the cause, but Medical Jurisprudence demands whether the wounds were inflicted by *accident* and absence of *crime*, or whether by *suicide*, or by a *murderer*, or whether it be a *homicide*.

There is usually a notable disposition on the part of the examiners, especially if the body has been long dead, to hasten over the proceeding without thorough examination, while yet the demands of the state are imperative, and require very thorough inspection. Professor Beck begins his specifications of such cases by the relation of a case of after detection and punishment of a crime that was perpetrated in the arrondissement of Trevoux, in France, where a surgeon was deterred by the offensiveness of the smell from a proper examination, and pronounced the case as one of death without violence. A burial had taken place, and nothing more occurred until some persons disturbed the grave in their work of ditching, and, noticing the bones of the head to fall apart from under a bandage that had been pushed aside, the incident got their attention, and they themselves, having noticed the signs of violence, reported the case to the authorities. The imperial attorney ordered a special

examination of the head, and the result was that a case of murder was detected. The assassins were afterward arrested, their guilt proved, and they were punished accordingly. This one case alone shows how evidently the claims of the state require thorough examinations of bodies found dead under suspicious circumstances. The nature of the wounds that occasioned death is often of such a character as to prove whether they have been caused by violence from the hands of an assassin, or whether from suicide, or by accident. Wounds are often of such character as to preclude the possibility of having been self-inflicted.

A point may be borne in mind to distinguish accidental wounds from intentional, and which is of some value. It concerns the place and direction of the wound. Criminal intention generally causes them to be inflicted in vital parts, and the direction is such, also, as makes them more certain to be fatal. The nature of the wound, also, may indicate whether a *fatal weapon* was in use.

Fodere quotes a case from Kopp exemplifying this point well as to the direction and nature of the wound. A man was killed by a wound inflicted in the direction of the heart. The examination proved that skill was exercised in the thrust, and this of that character notable among German butchers in slaughtering animals (the case occurred in Germany). There was only one exterior wound, but which proceeded toward the heart and penetrated the pericardium, and upon this latter there were *two* wounds, side by side, of similar nature. A butcher with whom the deceased was known to have a quarrel was arrested, who owned that he had menaced the man by a threatening flourish of his knife, but without criminal intention, and that the deceased rushed upon him, and, by a false step, had fallen and so precipitated himself against the knife. But the statement was dis-

credited because of the double cut on the pericardium. The German butchers, in slaughtering, have a peculiar motion with the knife in their thrust. They endeavor to reach the heart, and after the first plunge partly withdraw the knife and then rethrust it, to make the wound more deadly. This explains the double cut on the pericardium, while it was only single at the outer orifice. The butcher was convicted by the evidence thus afforded by the direction and nature of the wound.

The following particulars need attention in the examination of a dead body found with wounds upon it: The ascertaining whether ecchymosis or suggillation be observable; also, as to position of the body when found; the attitude of its members; the expression of countenance; the appearance of the clothing.

Before proceeding to the consideration of the more special character of wounds, a few thoughts may be in place regarding the appearances of wounds, as to the evidences thus found in reference to the *time* and *manner* of infliction. *Ecchymosis* is a particular of importance. This is usually regarded as dependent on the injury being done during the life of the subject, since it is produced by percolation or transfusion of blood into the skin, this phenomenon being dependent upon the fluent state of the blood. This is a fact almost amounting to a principle, for it is seldom that any ecchymosis will take place by injuries or bruises made on dead bodies. And yet it *may* occur. Sometimes the body remains warm a long time, and the blood fluid. In such cases, if the force necessary be made soon after death, ecchymosis or discoloring *may* occur. The discoloring in ecchymosis is from yellow to green, purple or livid, to black, according to time and the extent of the change in the state of the blood extravasated.

The *swelling* of contused parts is also much dependent upon the state of the life properties of the parts. Injections or congestions depend upon the presence of irritation, and so upon life. *Eversion* of the edges of a wound inflicted during life will take place, and not after death.

The following may be regarded as among characteristic signs of the time of infliction, whether in life or afterward: In *lifetime* injuries there will be noticed the following: (1) Eversion of edges; (2) free hemorrhage, mostly of arterial blood, with diffusion of blood into surrounding parts, occasioning a flush; (3) presence of coagula. In inflictions *after* death, the signs are: (1) Closeness of the margins and flabbiness; (2) absence of much bleeding, and, if present, then of venous blood that remains thin; (3) absence of coagula; (4) absence of diffusion into surrounding cellular tissue. But these signs are all dependent on the time of infliction after death. When done soon after death the signs are nearer to what they would be when occurring during life.

BLEEDING OF WOUNDS: The question will always naturally occur as to the extent of loss of blood that is necessarily fatal? This question is much easier asked than answered, and yet the medical witness has to decide in many instances; in these, a point must be recognized as a determining one: The tolerance to the loss of blood depends on various facts and conditions, comprising age, sex, vigor and health. A child will die from losing a small quantity; an aged person likewise. The witness must be well posted in the pertinent facts, and have them sufficiently sure to enable him to say whether or not the death resulted from the loss of blood. The quantity of blood in the body is usually reckoned at about one-fifth its weight, making to an average-sized man, say thirty pounds. Of this, one-fourth is arterial,

and three-fourths venous. A necessarily fatal amount of loss is regarded to be one-eighth of the weight of the body, or about eighteen to twenty pounds. But the judgment must take into account the tolerating conditions. The feeble, young, old and females are less tolerant. A child may die from bleeding even in very small amount proportionally. Quick loss is more dangerous than slow. Arterial blood can be less spared than venous. The arterial is *bright* red; the venous *dark* red. The danger is greater when the bleeding artery is near the heart, or in direct force of the ventricle. If not arrested, death will necessarily result from division of the carotid, subclavian, humeral, iliac, femoral, and their immediate branches. Great danger comes from lacerations of first, second and third divisions of arteries thereafter.

INTERNAL BLEEDING OF WOUNDS: This manner of bleeding adds to the danger of death from simple loss of blood that arising, also, from the *presence* of the discharged fluid where it can not be tolerated. Yet this fact also obtains: that bleeding internally is not generally as free as the external, unless accessible to an open cavity. Blood deposited in the brain is very apt to be fatal, when even in small quantity. Large discharges into the pleural or peritoneal sacs are fatal.

MECHANICAL INJURIES TO VITAL ORGANS: These also come among the direct causes of death from wounds. A wound may crush the skull and fatally injure the brain. It may impinge upon the heart and arrest its functions. So may it be with the lungs and other viscera. The mechanical injury may result from the impacting of the blood upon the brain, spinal marrow and the viscera.

THE SHOCK ON THE NERVOUS SYSTEM: The immediate impression of a great wound upon the sensation may occasion death directly. The structures all have certain life endowments; whether these consist of sensibility,

irritability or excitability, or whether it be still some unknown entity, it is certain that this life principle may be overwhelmed. The effects of prussic acid, of electricity, and the shock by a very severe wound, seem alike upon this life principle. The witness, therefore, in recognition of this fact, finds himself able to account for the direct results of an injury in death, when otherwise he might not be able to do so.

WOUNDS INDIRECTLY FATAL.

CHAPTER VI.

MEDICAL JURISPRUDENCE invests the question as to *indirect* fatality of wounds with much interest. The medical witness, therefore, must be able to be precise in conclusions, however difficult the case may be. The life of the prisoner probably hangs now upon this very decision of the expert. If the case is pronounced as certainly caused, although *indirectly*, by the injury done, then conviction must follow. On the other hand, no convictions take place on mere *probable* causes. The death must be proved to be *certainly the result of the injury that has been inflicted*; but this may yet be quite *indirect*—that is, a *consequence*. The conservative forces of nature are great, and may suspend for a time the fatal consequence of an injury; while yet the expert witness may, by force of his discoveries in the case, be necessitated to declare the death to have been caused by the injury originally inflicted. In the case of the lamented President Garfield, this question became one of great interest and involved the main question: Did Guiteau kill Garfield?

The lines of inquiry may run in these two main directions: *First*, was the nature of the injury such as would naturally result in death? *secondly*, was there a subsequent cause, independent of the original one, that was sufficient to occasion the death? In other words, was the primal injury, in its cause of death, contingent on accidents subsequently occurring, and would the individual,

but for the supervention of other causes, have really recovered? This is the nice question that tests the intelligence and professional ability of the witness.

BLOOD POISONING: The main *secondary* effect of a wound that is liable to be fatal is called *blood poisoning*, being occasioned by the absorption from the wound into the circulation of a poison that is the product of chemical action in the dead matter of the wound. Fortunately, this result is not of very common occurrence, except when there is much dead matter, and when it is long remaining in reach of venous absorption; yet it is still of a frequency of occurrence sufficient to occasion the close observation of the medical expert. When death occurs from blood poisoning from a wound, the medical witness will have to pronounce the wound to have been the cause of the death. Still, there has been a limit put on the time elapsing between the wounding and the blood poisoning, and decisions of courts have varied on the lapse of time that may be regarded as characterizing the case.

POISONS.

A VERY large proportion of the occasions for expert testimony relates to the criminal use of poisons. The medical as well as the law student has necessity, therefore, for very thorough study of the signs or evidence of their use. The most available means of detecting the use of poisons is by post-mortem examinations. The methods of conducting these will be found elsewhere. Here will be in place now the consideration of the various kinds of poisons that are most commonly employed for criminal purposes.

The law concerning poisons is as follows: "Whosoever shall administer, or cause to be administered to or taken by any person, any poison or *other destructive thing*, with intent to commit murder, shall be guilty of felony."

"Whether the administering be followed by any bodily injury or not, the act is still a felony, provided the *intent* has been to commit murder. The *attempt* to administer or cause to be administered to, or to be taken by, any person any poison or *other destructive thing*, with the like intent, although no bodily injury be effected, is also a felony. If any doubt formerly existed whether the *external* application of poisons—*e. g.*, by wounds or ulcerated surfaces—would be included in the words '*administering*' .

or taking,' they are now entirely removed by the Criminal Law Consolidation Act (August, 1861). The twenty-second section specially applies to such an offense, and the fifteenth section provides that: 'Whoever shall, by any means other than those specified in any of the preceding sections of this act, attempt to commit murder shall be guilty of felony.' Graves justly remarks, with regard to this important addition to the statute law, that 'the malicious may now rest satisfied that every attempt to murder which their perverted ingenuity may devise, or their fiendish malignity suggest, will fall within some clause of this act, and may be visited with penal servitude for life'" ("Notes on Criminal Law Consolidation," p. 49).

Under section 22 of this statute, in reference to attempted poisoning, some offenses are comprised which formerly escaped punishment.

"SEC. 22. Whosoever shall unlawfully apply or administer to, or cause to be taken by, or attempt to apply or administer to, or attempt to cause to be administered to or taken by, any person any chloroform, laudanum or other stupefying or overpowering drug, matter or thing, with intent, in any of such, thereby to enable himself or any other person to commit, or with intent, etc., to assist any other person in committing, any indictable offense, shall be guilty of felony.

"SEC. 23. Whosoever shall unlawfully and maliciously administer to, or cause to be administered to or taken by, any other person any poison or *other destructive thing*, so as thereby to *endanger* the life of such person, or

so as thereby to inflict upon such person any grievous bodily harm, shall be guilty of felony.

"SEC. 24. Whosoever shall unlawfully and maliciously administer to, or cause to be administered to or taken by, any other person any poison or other destructive or noxious thing, with intent to injure, aggrieve or annoy such person, shall be guilty of a misdemeanor.

"SEC. 25. If, upon trial of any person charged with the felony above mentioned, the jury shall not be satisfied that such person is guilty thereof, but shall be satisfied that he is guilty of the misdemeanor above mentioned, then, and in every other such case, the jury may acquit the accused of such felony and find him guilty of such misdemeanor."

It is to be noted that the word "poison" is not confined to a strict definition by the law, but the words "or any destructive or noxious thing" are added to avoid equivocation upon the term used. Thus, such articles as iron filings, powdered glass, sponge, pins, needles and such things, that are not intrinsically poisonous, but occasion the mischief they do by irritation, are covered by the provisions of the criminal law.

The medical expert will take occasion to note the habits of the subjects, as to whether formerly they were addicted to the use of such articles as may, in the case, have caused death. This relates to the question of what may be pronounced as a poisonous dose. Persons that have been in the habit of taking noxious drugs will endure the effects of large quantities. In cases where children were brought up in the use of laudanum or

other such drugs as soothing agencies, and in which practice nature provides *defense*, the *poisonous* dose is to be put at far greater quantity. Thus, a dram of laudanum, or even half an ounce, may not do harm, while in other cases one-fifth part of such dose may do great harm. Arsenic is taken by ladies for the purpose of improving the complexion until the system sometimes endures incredible doses of this dangerous drug.

These facts, therefore, are to be borne in mind when testimony is given in cases of poisoning.

Idiosyncrasy must be taken into account, also. It is known that some constitutions are very peculiar. Instances occur of persons that could take some one or other of the virulent poisons with comparative impunity. But the immunity is usually special, so that while some poisons do no harm, others may.

Poisons may be divided into two main classes, according to their mode of action—namely, *irritants* and *neurotics*. The latter may again be subdivided into *cerebral*, *spinal* and *cerebro-spinal* poisons, accordingly, as they effect prominently the brain, spinal marrow, or both of these jointly. Divisions of the irritant poisons are also sometimes made into mechanical and chemical, and the latter into acid and alkaline. These latter—that is, the irritants—are not properly poisons, and produce destructive effects only conditionally, depending upon the circumstances of their use, entirely.

EVIDENCE OF POISONING IN THE LIVING SUBJECT.

The expert requires a different line of evidence in the living from the dead subject for the determining of the case. In the living the evidences are usually denominated symptoms, while in the dead they are called signs, although the meaning of these two terms is little different, except as in habitual application. In the former, however, the thing implied contemplates action, while in the latter it means passive state or condition.

In the living state the evidences of symptoms are had in observation mostly, while in the dead subject there is, in addition to what we can observe by appearances addressing the eye simply, the addition of chemical tests to a larger extent than those are practicable in the living body.

Symptoms: While there is considerable difference in the symptoms of poisoning, dependent upon the difference of the causes, there is this one thing to be observed as a notable mark—that is, that the symptoms of poisoning usually come on more suddenly than those occasioned by other disturbing causes, as those of diseases generally. Of course, exceptions are to be noted.

There are a number of substances, commonly resorted to for criminal purposes, that produce their effects very speedily: these are prussic acid, oxalic acid, strychnia and the corrosive poisons. Only a few minutes usually elapse before very decided symptoms manifest themselves. In the case of prussic acid, death ensues almost

instantaneously, if a fatal dose of it be given. In all these cases, the action of the poison, when fully developed, seldom admits of any remedy.

The following are the points laid down by Professor Taylor in his "Jurisprudence" that require attention by the medical jurist :

"Symptoms: (1) Time of their occurrence—their nature; (2) the exact period at which they were observed to take place after a meal, or after food or medicine had been taken; (3) the order of their occurrence; (4) whether there was any remission or intermission in the progress, or whether they continued to become more and more aggravated until death; (5) whether the patient had labored under any previous illness."

The more obvious symptoms of poisoning are, when one in otherwise good health is suddenly taken with violent pain, nausea and cramp in the stomach, vomiting, convulsive action, sense of suffocation, vertigo, giddiness, delirium, drowsiness or stupor. The first indicate the acrid poisons; the latter, narcotic. If these symptoms, or several of them together, soon follow the taking of food or some substance that might be suspected, it is pretty good evidence that poison has been taken.

The special symptoms of poisoning will be found under the several heads of special substances as poisons.

SIGNS OF POISONING IN THE DEAD BODY.

In many cases, the expert is not called for the examination of cases until after death. The distance, or the suddenness of the death, may have been such as to prevent earlier attention. In this case, the evidences of poisoning must be expected to be different from those of the living subject. In the latter case, the working of the poisons is to be investigated; in the former, the ultimate effects. The one has active symptoms; the other passive signs.

The signs of poisoning that are to be detected after death are mostly found in the alimentary tract. This is the case more especially when the acrid poisons have been used. There are evidences of inflammation in the mouth, throat, stomach and intestines. This relates to cases of sudden effects, when there is an absence of other lesion than simply inflammation. If the case is of longer duration, the coats of the passages will be found, more or less, to show signs of ulceration. Sometimes ulcers, of various sizes, are found in the substance of the organs. There are also discolorations, of various hues — red of different shades, purple, green and black; extravasation into the tissues or between the membranes. This may be of blood or of other substances.

The effects of the narcotic poisons are not readily distinguished. It is a mistake to suppose that the narcotic poisons produce a more rapid tendency to putrefaction, or to cause a red, swollen or discolored appearance of

the face or the mucous surfaces, or that the extremities in those poisonings are more flexible. These appearances sometimes are found, but they are not of sufficient certainty to afford a proof of narcotic poisoning. Indeed, it would be the better way not to observe these appearances as distinguishing signs in this particular. For then the other means of discrimination may take all our attention, and endeavors may be made to detect the presence of signs of other poisons than the narcotic. Thus the effects of the irritants and corrosive poisons can be traced sometimes, and then, in the absence of proofs of others, the *narcotic* may be suspected.

CORROSIVE POISONS.

CHAPTER VII.

ACIDS — MINERAL, OXALIC.

Symptoms in the Living Subject: Organic lesions are the common signs of those poisons. The slightest signs are redness and inflamed appearances of the membranes of the alimentary canal, apparent mostly in the mouth and throat. But these signs are almost always very apparent in more destructive effects upon the parts reached. The mouth is corroded, and of white appearance on the surface. This extends to the throat and into the windpipe, or as far as inspection admits from the mouth. There is intense pain of a burning character. The distress is so great when the acid is swallowed that the body is usually bent together, and convulsions are apt to ensue. Severe nausea ensues, and vomiting of fluids and froth in shreds, and of a darkish matter, often like coffee-grounds, when sulphuric acid is the cause. There is difficulty of breathing, great thirst, quick but feeble pulse, pale or livid countenance, when breathing is impeded by entrance of the poison into the trachea. The intellect is usually clear, but there is great anxiety and nervousness. Of course the symptoms are varied by the amount of the poison taken. The swallowing of a large quantity of acids of full strength will at once prostrate the person in the most extreme anguish, and the cause of it is at once apparent.

If water is drank when sulphuric acid has been taken, the distress is increased by the heat and cooking of the

tissues. In this case the white appearance of the surfaces affected is more decided. After an hour or two the whiteness of the corroded parts, which is like wet white paper at first, turns darker. If the acid be nitric or muriatic, the color of the corroded surfaces is yellowish, and not white, as in sulphuric. Generally the poison may be detected by the breath, if it be from nitric or muriatic acid.

If pressure against the parts is made it is painful, as in case of burns. Pressure over the region of the stomach is exceedingly painful.

The fatality of the poisoning by the acids is dependent upon the concentration or strength, rather than the quantity taken. And if the stomach contains food when the poison is swallowed, the effects upon this organ are less severe than is manifest in the mouth and throat, because the concentration and corrosive power is diminished—unless the contents be water, when the heat produced by chemical action makes the case worse.

In poisoning by oxalic acid the symptoms are less of a corrosive character, and they are slower in development. The acid taste also is more decided. The color of the membranes is also whitish. The sensation on the parts affected topically is also as that of burning and acidity. The distress in full fatal doses is similar to that produced by the mineral acids—very great. There is the same disposition to vomit, and the matters thrown up similar, also, except they may be darker, or green. There is a more decided prostration of the living powers in this case, the patient, in fatal doses, usually falling down, with inability to rise.

The breathing is laborious, and inspirations deep and prolonged—often long intervals between them. There is in this case stupor and languor, that is not observable in the case of the mineral poisoning; the pulse is small,

irregular, and often unobservable; the skin is cold and clammy; the countenance pale or livid, when the breathing is more affected. Death in poisoning by the acids, as to time of occurrence, is variable, depending on the amount of poison taken. It may ensue in an hour, or less, or not for a day or two.

SIGNS OF ACID POISONING—ON THE DEAD BODY.

The appearances of poisoning by the concentrated mineral and oxalic acids are somewhat variable, according to the rapidity of the effects and amount of inflammation that ensued.

The more marked effects are not always to be found in the stomach, but are more apparent in the mouth, throat, œsophagus and trachea. The stomach may have been protected by food or other materials present.

In the mouth and throat a white appearance of the surface, more or less changed by what may have been taken or brought in contact, is notable. Beneath this may be found injections of blood of various appearances, but usually dark by chemical action. In nitric acid poisoning the color is often yellow or orange on the inner surfaces, as is the case before death in the poisoning.

The corroded appearance of all the parts affected directly by the acids is a notable thing. The tissues being softened, the membranes corrugated, and in the gullet appearing in longitudinal wrinkles. This tissue may be detached or it may hang in flakes. If death did not soon set in, there is usually the sign of the great inflammation that sets in from the irritation that had ensued.

The stomach, if not perforated—which is often the case—will be found collapsed and contracted. Its contents are dark, black or brown, and of a tarry consistence

when sulphuric acid is the poison. When perforated, the margins are soft, dark and eorrugated. The contents may not all have escaped, and may be mostly of altered blood, if no food be present. Acid in the stomach may not be present, owing to time of decease or to agencies used for counteraction. If perforations exist, the adjacent organs are affected by the corrosion or inflammation. Thus the liver is liable to be blackened, and the aorta, also, though to less extent. The diaphragm, spleen, peritoneum and intestines may show signs of the escaped acid.

Chemically, the most simple tests are by the contact of thin splits of wood, which will be charred or earbonized; sugar and other organic substances are similarly affected. By heating this effect is made more obvious. When boiled with wood or strips of copper it will, in the presence of sulphuric acid, give out fumes of sulphuric acid; nitric acid giving its pceuliar fumes. The diseoloring of wood or other organic matter with nitric acid is yellow. When diluted, these tests are not available, and we must proceed at once to the tests of chemical reagents.

For sulphuric acid the chemical test is usually by the nitrate or chloride of barium. Having ascertained, by test paper, whether acid be present, the baryta is used, if acid exists, in form of solution, mixed with the filtered liquid of the stomach contents, or these with water. If sulphuric acid be present, a dense white preeipitate is formed of sulphate of baryta. This is insoluble in all the acids and alkalies, and the test is good.

Another convenient test for sulphuric acid is by varatria, which, when mixed with the acid even in a very dilute state, will, on evaporation, produce a beautiful purple color. Nitric acid gives a test, when present, by use of potash for neutralizing, evaporating, and then examining its crystals.

The peculiar fumes of muriatic acid may usually be recognized in testing for it. Its most convenient chemical test is by boiling with the peroxide of manganese. In this process chlorine is evolved in tangible form.

Again, when concentrated, and a slip of gold leaf be immersed, it, while alone, will not produce any effect; but by adding a few drops of nitric acid the gold is dissolved, by the aqua regia thus formed, if heat be added. By diluting, then these properties are lost. But now, by adding a solution of nitrate of silver, a dense white precipitate is formed. This precipitate is insoluble in nitric acid, but soluble in ammonia. It acquires a purple and black color on exposure to light, and if heated it melts without decomposition, but forms a yellow solid on cooling.

Chemical tests for oxalic acid are of more importance in jurisprudence than those of the mineral acids, because it is more frequently used for criminal purposes.

Nitrate of silver added to a solution of oxalic acid produces the oxalate of silver—a beautiful white precipitate. This is a very good test, as a quantity of oxalic acid so small as not to be detected by test paper is determined by the nitrate of silver test. The oxalate of silver has its test then by nitric acid, which completely dissolves it cold. And by dissipation on platinum it will all go into white vapor with slight detonation, and this detonation arising from detached particles.

ALKALINE POISONS.

CHAPTER VIII.

POTASH AND SODA.

It is less common that either the acids or alkalies are employed for criminal purposes than other substances, because these are so topical in their effects, and thus more readily detected by physical appearances; and because, also, of their less certainty in fatal effects, except when used in highly concentrated form and large doses, in which cases they do not readily admit of a disguise. For suicidal purposes, however, this objection is less cared for. Still, there are some instances of criminal poisoning by these agents, and, with the alkalies, as with the acids, it is best to have some knowledge for detection. Potash and soda are the most common of this class, and they are much alike in the principles of their action and the symptoms which they produce, and therefore may be treated together, as were the acids; and what is said of the principles of their action may also be understood of the other earthy alkalies. The carbonates and nitrates of these bases are the forms in which they are used when given as poisons.

Symptoms in the Living State: There will be, during the act of swallowing, an acrid caustic taste. When taken sufficiently concentrated they will excoriate the mucous membrane of the mouth and throat, and produce a persistent sensation of burning, which is felt in the mouth, gullet and stomach. Vomiting may follow, but is not a constant symptom. When it does occur, the matter thrown

up is a dark, frothy fluid, mixed with blood and detached flakes of the mucous membrane. This effect depends upon the degree of causticity of the carbonates. There will soon be purging and pain in the bowels, attended with great tenderness over the abdomen on pressure. The surface is cold and clammy; the pulse is feeble; there is redness of the mouth and tongue; the lips and throat become swollen and soft.

When these substances are taken in a weaker form or state, they occasion continuous purging and colicky pains, with tenesmus.

On the surface ecchymosis; from the lungs, hemoptysis, and hematemesis of all the mucous surfaces. Death may occur speedily, but is usually an occurrence in from one to three days when a moderately fatal dose is taken. The death occurs in the full inflammatory stage of the symptoms.

Signs after Death: The impression of the poisons may be traced, as from the action of a caustic, in the mouth, throat and stomach. The covering membrane is softened, and detached in patches, where is the presentation of a deep chocolate color or black appearance. The larynx and trachea may present the same appearance. The stomach is puckered and swollen, its tissues injected with altered blood, and clots of blood are likely to be found loose in this organ. If the poisoning be protracted, there will be ulceration, gangrene and sloughing of the tissues. The omentum may be found destroyed, and the glands of the mesentary more or less absorbed. The liver is of a dark green hue, owing to diffused bile, and the gall-bladder is likely to be greatly distended.

Chemical Tests: The alkaline reaction on contact of acids is the most obvious and simple test. With nitrate of silver, the nitrate solutions give a brown precipitate, and the carbonates a whitish yellow one. In the tests

potash may be known from *soda*: *first*, by the former, when not too much diluted, it will give, with perchloride of platinum, a canary yellow precipitate; *second*, it precipitates a granular white substance with the solution of tartaric acid, if of sufficient strength, when a little alcohol is added: while *soda* is not precipitated by either of these tests. Again, if we neutralize the two alkalies by dilute nitric acid, and evaporate on a pane of glass, it will be easy to distinguish the two, as the crystals of *potash* are long, slender and fluted, while those of *soda* are in rhombic plates. With the organic materials present, these chemicals—*soda* and *potash*—produce a slimy or soapy substance, that shows the alkaline reaction and gives their odor. Evaporated to dryness, and the residue then incinerated in a silver or porcelain capsule, the alkali will be recovered from the organic matter in a state of carbonate by digesting the residuary ash in distilled water. It then gives the usual characteristics of these carbonates.

AMMONIA.

The strong carbonate of ammonia or solution—aqua ammonia—may destroy life by its vapor. This comes from the spasm of the glottis and the exclusion of air; or it may produce fatal effects by overpowering the nerve sense. Mischief is often occasioned by the ignorance of persons in applying ammonia to the nostrils in cases of fits and syncope. The patient unconsciously inhales it, if respiration is present, to an extent of doing oftentimes not a little injury. The symptoms are those that indicate croup—a sensation of choking and inflammation of the air passages.

Symptoms: In poisoning by ammonia the symptoms are somewhat similar to those of the other alkalies treated of. The irritation is greater and the constitutional sym-

pathy more considerable; and the impression on the air passages is also greater. In the mouth and throat, and more particularly in the larynx, the appearances to the eye resemble those of croup.

After death the signs are very much like those of poisoning by soda and potash, except that the corroding effects seem to be deeper, and the signs of inflammation more notable, perhaps.

Chemical tests distinguish ammonia from potash and soda by its volatility and its peculiar pungent odor. It has the same alkaline reaction, except when free from carbon, when it will not effervesce with acids.

Ammonia occasions death a little more speedily than the foregoing alkalies.

PHOSPHORUS.

This substance, though poisonous and readily fatal in its effects, is not much employed for criminal purposes, because it is too easily detected. Its smell, taste and luminosity are so obvious as to make it inconvenient for deceptive use. Taylor cites a case tried in the Norwich Assizes, England, 1871, in which the person arraigned was a young girl that intended to poison a family by putting rat poison (containing phosphorus) into a teapot containing tea for use. But the smell produced at once occasioned the detection of the intended crime, and the girl was convicted and sentenced to penal servitude for life. Casper, of Berlin, Germany, gives an account of a case where phosphorus had been put into food with criminal intent, which was discovered by the luminosity. The poison had been put in soup by a woman that intended to destroy her husband. But the stirring of the soup in the dark, causing luminosity, led to the detection.—*Vierteljahrsschrift*, July, 1864.

SYMPTOMS: Phosphorus is properly classed with the irritant poisons; but it is slow in its action, as compared to many others. It is also uncertain in its effects, depending upon the state in which it is administered. In its allotropic state it is not poisonous. Given in moderate quantities, as that of a half to a full grain, it seems not to be injurious, but is regarded as beneficial, and no doubt is so. It is a constituent of many tissues of the human body, particularly of the brain, nerves and bones.

When taken in poisonous doses, as that of five or ten grains, the symptoms, though irregular, are yet decided. They may appear in a few hours after taking, but usually not so soon. Sometimes, after symptoms of poisoning do appear, they will pass off, and the subject will be about in apparent health; and afterward the same or other distressing symptoms come on again, and the person may die in the course of a few days or weeks afterward. Sometimes the full poisoning effects are prompt, violent and fatal in a few hours; yet it is regarded as a slow poison. The first impression is in the mouth, most generally, and is notable as a disagreeable taste, resembling somewhat that of garlic. Then there is irritation in the mouth and throat. This is attended by a sense of burning, and of pain in the stomach. But the pain is not always present to much extent. There is often nausea and vomiting. The matters thrown up are dark, black and greenish in appearance. Often the appearance of coffee-grounds is presented. The peculiar garlic-like odor is present in what is thrown up, and luminosity is always observable in the dark.

The pulse is small, frequent, and often scarcely perceptible. There is prostration of strength, tremulousness, stupor, and sometimes convulsions ensue. Jaundice is not uncommon as one of the symptoms. There may be purging, and that which comes away has the garlic

and otherwise fetid or offensive smell, and is luminous in the dark. There is usually great thirst, and a bloating of the stomach and bowels. Petecchie appears on the skin oftentimes.

Irritation in the bronchia is common, and a cough and oppression in the chest is a notable symptom. The time in which death from poisoning by this agent occurs is variable, from a few hours to several weeks.

POST-MORTEM APPEARANCES: In the *primæ viæ* there are the usual appearances of the action of a corrosive poison—inflammation, injection and corrosion; patches of extravasation and clots of altered blood. In all parts there is the peculiar garlic-like odor. Ulcerations and perforations of the stomach are apt to be found. The brain is injected, and there is serous effusion between the membranes. The heart may not be much affected, but may be softened, and in a flabby state. The liver is very likely to present appearances of the poison's effects. It is likely to be softened, and even in a partially decomposed state; and if more time has elapsed, it may be entirely soft and pretty thoroughly decomposed. The degeneration of the liver is what is called the *fatty degeneration*. Purple spots are to be seen often on all the serous surfaces; also on the skin and in the substance of the flesh and other soft tissues. This, in character, is as ecchymosis. In all parts the garlic smell may be observable more or less.

Chronic Phosphoric Poisoning: In poisoning that has taken on the chronic form, the symptoms are still more variable than those of the acute form. A not uncommon one is eructations from the stomach of fetid gases, *i. e.*, of phosphureted hydrogen. Nausea is common, and sometimes vomiting. Burning sensation in the stomach and occasionally purging are symptoms; also pains of the joints, wasting of flesh, debility, hectic fever, and, ulti-

mately, complete exhaustion and death. Appearances are liable to be deceptive, for the subject may improve and seem to be in a sure way of recovery, and then relapse again. Recurrences of these changes may happen.

CHEMICAL TESTS: A method of determining its presence is to reduce it to its elementary state by mechanical and chemical separation. Thus existing, it is a solid of waxy consistency, yellowish color, and has a peculiar garlic-like odor. It evolves a white vapor in the light, and in the dark it has a bluish luminosity. It melts and takes fire at a temperature of 113 degrees, burning with a bright yellow flame, producing dense, white vapors by the combustion. It is insoluble in water, although water (in which it is usually kept), when clear, even, will, when long in contact, be found to be poisonous. It is soluble in alcohol, ether, chloroform and the oils.

In testing for it, the odor is a pretty good proof as to its presence. Even when mixed with various other matters, this is capable of being detected. To obtain elementary phosphorus from the materials of a dead body, the parts are to be macerated in water and thoroughly washed. The phosphorus, not being soluble in water, may, if not chemically held, be thus precipitated in globules to the bottom of the vessel. Thus a stomach may be treated in this way when laid open, and, with its contents, be macerated in cold water just sufficient to cover all. Now, while this maceration is going on, the vessel may be carried into a dark place, and, stirring the materials in the water, a luminosity may be discovered. When the maceration and agitation have been continued for a few hours, or half a day, then the stomach and its bulky contents (if any) are to be lifted out in a way that will permit the precipitation of the phosphorus. To collect the phosphorus from this fluid, the globules may be decanted into a test tube or bottle, and the latter then

plunged into hot water, when the globules will melt and run together into a mass. Or, having them thus in a glass, hot water may be poured upon them thus contained, and, by melting, a mass is formed of the globules.

Phosphorus is extremely soluble in sulphide of carbon; and therefore, by means of this liquid, the phosphorus may be extracted by digestion from any recent animal matters that may contain even but a trace of it. To manage this proceeding, it is only necessary to let the vessel containing the digested materials stand until the solid materials settle to the bottom. Then the sulphide that contains in solution the phosphorus is decanted or drawn off with a glass syphon, and then evaporated to produce the elementary phosphorus in globules. These may then be heated in water to run them together.

If, however, the quantity of phosphorus thus obtained by digestion in the sulphide of carbon be too minute to allow its being gathered, then it may be subjected to distillation in a flask or retort (glass) having a condensing tube in cold water to receive the distilled vapors. In this process the vapor, passing into the condensing tube, is beautifully luminous, and affords a very striking test of the presence of phosphorus. This method was first suggested by Mitscherlich, and is so delicate that the phosphorus on a single lucifer match will produce a luminosity in the condensing tube of very notable character that will continue for half an hour. But in this process it must be borne in mind that the presence of the vapor of alcohol, chloroform, etc., in the condensing tube will spoil the effect, since they will prevent the luminosity. This precaution is to be observed, as it is very common that parts kept to be analyzed are put in alcohol or ether for preservation.

But if the person taking the phosphorus has survived for a few days, it is improbable that free phosphorus is to

be found in the stomach. In such cases the expert should not hazard an opinion; for when the poison is once taken out of the stomach and has entered the secretions, the tests are not readily demonstrable.

Then, also, it must be borne in mind that in this case, as in all others of poisoning, there may have been antidotes administered that may have chemical affinities for the poison, and thus change its characteristics.

NEUTRAL AND METALLIC POISONS.

CHAPTER IX.

IODINE.

IODINE is rarely used as a poison. Its remarkable power for coloring being so certain to insure detection, it is usually avoided. As a poison it belongs more properly to the corrosive class. But yet its more extended powers are readily traced, even when given in small doses.

Symptoms: In large doses iodine produces a burning and excoriating effect upon the mouth, throat and stomach, if in concentrated form. Severe pain in the stomach soon follows its administration, which is attended with nausea and vomiting, as well as purging. The matters thus thrown out are always deeply stained by the iodine, which has this power in minute quantity. Its odor is also readily recognized.

It is to be borne in mind, however, as to the character of the color of the ejecta, that if in the food in the stomach there be farina present, as from flour, meal or potatoes, the color will be blue instead of yellow.

There is great thirst, headache, giddiness and tremor, with lassitude and fainting, present as symptoms. Salivation and dyspnœa are some of the characteristic symptoms, also.

The pulse is small and frequent, and in chronic poisoning the glands become affected and shrunken. So with the testes of the male and the breasts of the female. There is ultimately wasting of the entire body and serious lung disturbance, giving, by these two symptoms, the appearance of one affected by consumption.

Analysis: Since this article is not a usual agent for criminal purposes, the jurist does not require an analysis to be here given. But the presence of iodine in a dead body is not unfrequently known by the odor it produces, and the starch test, being so universally known, will serve every necessity—the presence of the slightest traces of iodine being detected by the blue tint given to a cold solution of starch. Still, it is to be remembered that there may be present substances that will interfere with the starch test. In such cases the sulphide of carbon may detect it by the rich pink hue it develops by contact.

ARSENIC.

There is, perhaps, not another drug that is more frequently employed for criminal purposes than arsenic; and both the medical and legal man will do well to acquaint themselves thoroughly with it in all particulars. Expert testimony will ever be most likely to relate to this article. This is the case because there are several reasons for the preference with persons criminally disposed to resort to arsenic for the accomplishment of their wicked purposes: *First*, arsenic is very certain in its effects, and, *secondly*, it is somewhat easily disguised; then it also requires comparatively but a small quantity to do the mischief. It is the white arsenic, or arsenous acid, that is the common form of the use of the drug. It is the common agent, also, for use in the purpose of destroying vermin, and its purchase, therefore, is less likely to excite suspicion. Furthermore, it is cheap and easily procured, since it is kept by all dealers in drugs. A still additional object is its being without any taste that is appreciable—a circumstance so favorable for stealthy administration.

Action on the Living Body.

Symptoms: The form and dose in which the drug is administered determine largely the character of the symptoms it produces. It usually develops its effects speedily—that is, within half an hour or an hour from the time it is taken. It first produces a sense of sickening or faintness and depression. Soon this is followed by nausea and a burning pain in the stomach, which is increased by pressure. Vomiting ensues, and the matters thrown up are brownish, turbid, mixed with mucus and generally stained with blood. Sometimes there is bile present in the materials thrown up, and a yellow appearance is observed. Sometimes a violent purging sets in, attended with cramps in the calves of the legs, and thus the symptoms have some resemblance to those of cholera. The color of the ejected matter is variable, for, while often dark, it is sometimes white and of milky appearance; and it may be green or yellow, as stated above, from presence of bile. The vomiting is incessant, generally, and the purging frequent and attended with tenesmus.

The burning heat in the mouth, throat and stomach is attended with great thirst. The pulse is small, very frequent and irregular—often almost imperceptible. The skin is usually clammy, cold and of collapsed appearance, but sometimes hot. The breathing is distressing, from the tenderness of the stomach. There is great restlessness and distress. The cramps are often violent, and tetanus or trismus may supervene. Before death stupor and paralysis set in, or the patient may die in convulsions. Rarely, insensibility is produced, and becomes a symptom; but most commonly great pain and distress are the characteristics, and arsenic must be regarded as causing a *severe* death; and yet it is a common agent for suicidal intentions.

Chronic Poisoning: When smaller doses are given at protracted intervals, and in cases where a survival of first effects of a larger dose occurs, there are varied symptoms; and yet it must also be remembered that even in ordinary poisoning with arsenic the symptoms may vary greatly. Still, those above enumerated may be regarded as the common and characteristic ones. In chronic poisoning it will be observed that, additional to some of those now noted, there is a train of symptoms which—aside from others occasioning suspicion of arsenic—may be mistaken as signs of *other* causes. Inflammation of the eyes or conjunctiva and intolerance of light are not unfrequently present. Irritation of the skin, attended with vesicular eruption—*eczema arsenale*—which is accompanied by itching or smarting, as from nettle-rash, or even symptoms of scarlatina, may appear. Local paralysis and persistent numbness of the fingers and toes, nervous twitching and other signs of lesion of the nerves may occur. The hair is apt to fall off. There may be ecchymosis. Strangury may set in; jaundice, also. There may be protracted skin diseases produced, and particularly dry, scaly eruptions and peeling off of the cuticle.

POST-MORTEM APPEARANCES: The stomach and bowels present the greatest proof of poisoning by arsenic. Especially is this the case if the dose given be large, and the action continued severe for some time before death. In this case there are not only signs of great inflammation, but there is much ulceration or lesion of the tissues.

The attention of the examiner ought to be first directed to the stomach, and he will not go far before he will find decided evidence of the effects of arsenic, if it caused the death. This poison seems to have a peculiar tendency to affect the stomach; for, whatever may have been the mode of its access to the system, it still shows its great impression on this organ. The reports of Guy's Hospital

for October, 1864, show that in cases where arsenic had been applied to ulcers, and was thus absorbed and carried in the circulation, it still manifested its peculiar tendency to the stomach. Other incidents are in proof, also. In its application to the skin, in the nursery, where powders are dusted upon chafed places by those who have the care of young children, there have been instances of poisoning developed in the stomach from these applications. The powders that are sold for this use, as the *violet powder*, etc., are not always pure. Instead of starch, the powdered gypsum—terra alba—and sulphate of lime are used; and these are not always pure, for, unfortunately, white arsenic, that resembles it so closely, has been accidentally used in the manufacture of these powders, and before its detection (being thus sparsely used externally) great mischiefs have occurred. In the "British Medical Journal," June 1, 1878, there is a record of twenty-eight cases of poisoning by such applications, and of twelve deaths therefrom. Such cases always prove the stomach to have suffered greatly.

Disorganization of the tissues of the stomach, or, at least, a notable softening, with evidence of great inflammation, are among the common effects here discovered. The mucous membrane of the stomach is found covered with mucus tinged with blood, and this may be more or less altered. The membrane is detached in patches. There may be a pasty substance spread over the surface that is tinged with bile and blood, or the covering may be like soft soap whitened with the powder of arsenic, if this had been taken down in some quantity. It may have been given with chalk or magnesia, and thus produced the pasty coating of white. But the prevailing appearance of the contents of the stomach is dark, from altered blood.

Sometimes the walls of the stomach are thickened in patches, and this even to the presenting of appearances of tumors. But they (the walls) are also occasionally found thinner than in a healthy state. Ulcerations are present, if the case is old enough for this. Such appearances have been found as early as ten hours after administration; but Taylor states that ulceration and gangrene of the mucous membrane, as a result of poisoning by arsenic, is rare. Softening and perforation are signs that are present, but the latter is not very common, either.

The heart, lungs, liver, urinary organs and brain have all been found more or less variously affected. But these are not sufficiently characteristic to admit of reference as a ground for medico-legal evidence. These must only be taken as corroborative. It is the stomach, and next the intestines, that present the localities for the evidences. The mucous membrane of the bowels may be found inflamed throughout, but most commonly the upper part of the small intestines shows most signs of the poison. The duodenum still more frequently brings the proof, and is next in certainty to the stomach to show it.

It is proper to remark that, in view of the corrosive power of arsenic, and its great liability to occasion great inflammation, its less liability to occasion gangrene may be accounted for by recognition of the antiseptic properties of the drug. Arsenic usually kills in from one to three days, and a fatal dose is from three to five grains.

Chemical Analysis.

Here, now, we come to the important field for careful researches, both by the medical and the legal men who are likely to go into courts, as all competent men of these professions are.

Arsenous acid occurs as a white powder, which a lens shows to be crystalline. It has a feeble acid reaction when dissolved in water. It has no perceptible taste in small quantity. It is only sparingly soluble in cold water. Boiling it in water brings out more of its power; thus, an ounce of cold water in which arsenic may have been stirred, and then left to settle, will take up only about one-half grain of arsenous acid, and boiled for an hour in water, an ounce will take up about twelve grains.

Arsenous acid may be identified by the following properties: *First*, placed in small quantities upon platinum foil, it is volatilized entirely by heat at 370 degrees, and escapes in white vapor; and, heated in a test-tube of small dimensions, it will crystallize, without melting, into a circular group around in the tube of a most exquisitely beautiful appearance for luster and brilliancy. These crystals are characteristic, and further tests for identity are hardly necessary. *Second*, the boiling of a small quantity of white arsenic in water evinces the following particulars: resistance to ready solution and floating of the powder, in part, on the surface of the water, and the sinking of part in dry globules to the sides and bottom of the vessel. *Third*, Taylor gives the following: "When from one-fourth to one-twentieth part of a grain is heated with two parts of *soda flux* (obtained by incinerating acetate or tartrate of soda in a close vessel) in a glass tube about three inches long and from an eighth to a quarter of an inch in diameter, it is decomposed: a ring of metallic arsenic of an iron-gray color is sublimed and deposited in a cool part of the tube. During the reduction there is a perceptible odor resembling that of garlic, which is possessed by metallic arsenic only while passing from a state of vapor to arsenous acid."

Solution in water of arsenous acid gives a clear, colorless appearance, and affords no taste perceptible. A few

drops of this left to dry on a pane of glass will produce the peculiar octahedral, triangular-shaped crystals, perceptible by the microscope.

The *silver test* for arsenic is made by adding ammonio-nitrate of silver to a solution of the arsenic, when arsenite of silver is thrown down in a pale yellow precipitate, changed by daylight to an olive-green color.

The *copper test*: To the solution of arsenous acid in water add ammonio-nitrate of copper, when a light-green precipitate (arsenite of copper) is thrown down.

Sulphureted Hydrogen Test: Acidulate the aqueous solution of arsenic with a few drops of pure muriatic acid diluted, and then pass the sulphureted hydrogen through it. *Orpiment*, or sulphide of arsenic, is formed as a precipitate.

Process: Having now given tests for the arsenic in solution of water, it will be in order to find the means of placing the arsenic into such solution, when contained in animal tissues, or in materials in the stomach of a dead body.

For this purpose, use the fluids present in the stomach among other substances, or, if such are not present, then boiling the substances in distilled water for some time will afford the fluid; and this, being filtered through clean filtering paper, is now ready. Place this fluid in a glass tube, over one end of which an animal membrane is tied so as to constitute the *dialysing tube*, and then thrust this into a vessel of distilled water. Thus resting, in a few hours the arsenic will have, if present, passed through the animal tissue into the filtered water, and may now be detected, as above stated, by the silver, copper or sulphureted hydrogen test.

Animal fluids containing arsenic in solution may, after filtering thoroughly, have the arsenic precipitated as a sulphide of arsenic, by passing through them a pure sulphureted hydrogen gas for a time.

Distillation Process: When the quantity of arsenic present is too minute to be detected by the afore-named process, and particularly when tissues remote from the stomach, as portions of the heart, lungs or other parts of the body, may need to be subjected to tests, then the distillation process may be brought into requisition. This will detect very minute traces of the arsenic, and will take it away from all compounds holding it, except when in the form of orpiment, or sulphide of arsenic.

This process is conducted by drying well the substances, whether of the stomach or its contents, or of the liver, kidneys or other organs, by exposure to a current of dry air, or by heating by use of a water-bath. Then the dried substance is to be divided or broken up into fragments and placed in a flask or retort of suitable capacity, with a sufficient quantity of pure muriatic acid to drench it completely. Now, when it has thus been digested in cold, the retort or flask that contains the mixture, being not over half full, and which has a condensing tube so adjusted as to condense the vapors that pass through it, is to be placed in a sand-bath and distillation conducted thoroughly. The retort should have a metallic cap over it, that may be improvised by a piece of tin, so bent, after clipping and slitting, as to keep the heat in the retort up sufficiently to prevent the condensation in the upper part of the retort. A glass receiver must be adjusted to the outer end of the condensing tube, so as to receive the condensed vapors that the distillation produces. This receiver should contain a small quantity of distilled water in order to fix and condense the vapors that come over. Of course the receiver and condensing tube are to be kept in a state proper for condensing. This may be done by use of flannel or blotting-paper hanging over and receiving the drippings of cold water, or by other of the ordinary condensing appliances used in the process of distillation.

The distillation is to be carried on to dryness of the contents of the flask, or, at least, nearly so; and by this process the arsenic is collected in the receiver in the form of a chloride, and the separation in the retort avails for all combinations, even with metals—except with antimony, and, as before stated, its sulphide (orpiment) combination. But when the analysis is intended to be exact, then the contents of the flask may receive another addition of pure muriatic acid, and the process be repeated as before, in order to make sure that every particle of arsenic may be forced out of the substances in the flask. The residue in the flask can not now be supposed to hold any arsenic, except it be in the form of sulphide, or in combination with antimony; and the proper chemical tests for these will then determine as for this residuum.

The product of this distillation that we now have in the receiver may be of various appearance and of a very offensive odor, if it be the product of putrid substances. Exposure to the air abates this offensiveness, and at the same time admits of the precipitation of the arsenic as in a chloride. The examination of this product is now the matter in hand. As the arsenic is not soluble to any considerable extent in cold water, this product may be thoroughly washed and filtered, so as to leave on the filter the cleansed material. This washing is necessary only when turbid and offensive conditions obtain. One-third of the distilled product (either that collected by the filter or as found in the retort) may now be diluted with three parts of distilled water and boiled in a clean flask. While boiling, a piece of bright copper foil (free from arsenic) of about the sixteenth of a square inch is to be thrust into the boiling stuff; and now, if there be chloride of arsenic in the flask, even to the small amount of one-three-thousandth part of a grain, its pres-

ence will be indicated by a change of color of the copper, and by the deposit of a delicate dark film on the metal.

The further test is to be made by dropping a small quantity of this solution in the flask into a compound of equal bulk of solution of chlorate of tin and fuming hydrochloric acid, when a precipitate of reduced arsenic is formed. This can now be tested as for pure arsenic.

The remaining two-thirds of the first distillation product may now be subjected to varied tests for corroborating evidence. It may be distilled with pure hydrogen through a heated glass tube—heated by a spirit lamp—into a solution of nitrate of silver, held in a flask at the off end of the tube. This solution gives a very delicate test. The presence of arsenic is readily determined by a brown or black color of the nitrate solution, formed by the diffusion of the impregnated gas. If, now, there be added to this solution a weak solution of ammonia, a yellow color is produced in the mixed solution, and arsenite of silver is precipitated.

Of course, none of these processes of analysis determine anything as to the precise quantity of arsenic that may be in any tissue, or which may have been taken by the poisoned individual. They prove whether it be *present*—whether arsenic had been taken; and some judgment may be made as to whether much or little had been given.

The *Marsh* process, which is practiced in the hydrogen test just alluded to, is a popular and good one, and, joined with the *Reinsch* process, will give results that will be reliable for all demands of jurisprudence.

Arsenite of potash, or *Fowler's solution*, may be the form in which arsenic is used for criminal purposes, and other compounds of the poison may also be employed; but the process of analysis is not necessarily different in principle

for the detection of the presence of the arsenic itself. The *solution* has the odor of lavender, is of a reddish color, and has an alkaline reaction. One fluid ounce of it contains four grains of arsenous acid. It gives a green precipitate (arsenite of copper) with sulphate of copper, and a yellow one with the nitrate of silver. When acidulated with muriatic acid, and treated with a current of sulphureted hydrogen gas, it yields a yellow sulphide (orpiment), and, when boiled with this acid and pure copper in strips, a deposit is made of arsenous acid; *heated*, this will present octohedral crystals.

MERCURY.

Mercury is classed with the corrosive poisons. In its metallic state, as *quicksilver*, it is not poisonous, and, like all other metallic substances, requires to be in combination with oxygen or chlorine to acquire the poisonous properties.

Corrosive sublimate, or chlorate of mercury, is the form in which the drug is used for criminal purposes. In this state it is one of the most virulent poisons found in the mineral kingdom, and consists of hard, heavy crystals, usually in mass form and of semi-transparent character. Its taste is very decided and severe, is of peculiar character, and the drug can hardly be taken in any considerable quantity without being detected by taste. It dissolves readily in water, hot or cold, and still more speedily in alcohol and ether.

Symptoms: Corrosive sublimate produces its effects speedily. In the mouth it occasions a strong metallic taste, sometimes called *coppery taste*, that is quite persistent. In being swallowed, it causes a sense of constriction and burning in the throat and fauces. Speedily, pain is felt in the stomach, attended with nausea and vomiting.

The matters thrown up are at first mucus, of a long, stringy, white appearance. Soon there is a mixture of blood with this, and the vomiting becomes very severe, and is attended and followed by profuse purging. The distress and anguish soon become so severe that the poor sufferer becomes distracted, and falls writhing in misery. The pain and stricture in the mouth and throat are sometimes so severe as to prevent the power of swallowing even the mildest fluids. There is great soreness and tenderness over the region of the stomach—excruciating when pressure is applied. The countenance may be red and flushed at times, but is generally pale and haggard. The pulse is small, and sometimes imperceptible. The skin is cold and clammy, and the respiration difficult. Fainting, convulsions, insensibility, and death, in the course of a few hours, may occur; the latter event almost always takes place in from ten to twenty or thirty hours.

There are a number of other symptoms, varied according to quantity and the length of time after taking. The insides of the mouth may be swollen, red and sore; the tongue shriveled or swollen, and with a white covering. The breathing may be irregular and oppressed. Lung difficulties are not unfrequent, with symptoms as of phthisis. The liver is sore, swollen and hard. The urine may be suppressed and bloody.

A most remarkable resistance is sometimes set up by the forces of nature, not only against the action of mercury, but also all other poisons. The record of the poisoning of Sir Thomas Overbury in the Tower of London, instigated by the Earl and Countess of Somerset, is illustrative of this. The apothecary, on the wish expressed by the Countess that the most powerful of poisons should be brought to her, presented seven, as confessed to by himself—namely, *aqua fortis*, *white arsenic*, *mercury*, *pouder of diamonds*, *lapis costius*, *great spiders*,

cantharides. Remarkable as is the ease, the entire number of these deadly agents were really given to the unfortunate prisoner. In a record of this affair it is stated that arsenic was put with the salt he took with food; cantharides were put with partridges he ate; and "he never ate anything in which a poison was not mixed," was the confession of his keeper, Mr. Weston. At length, however, these numerous destructive drugs proved too great for the resisting powers of nature, and the man died after suffering anguish almost unspeakable during a whole day and night.

The symptoms in chronic poisoning are different from those just enumerated, to a considerable extent. The poison, when given in small doses for a prolonged period, precipitates itself frequently upon the glandular structures—these becoming inflamed, sore and painful. The gums, tongue, lips and throat are inflamed and become cracked into gashes; these often are deep and exceedingly painful. The gums bleed, and there is great flow of saliva from the mouth. Sometimes a deep blue line is to be observed running around the edge of the gums. There may be great distress in breathing and swallowing. The constitutional disturbance also is great: there is much irritation, fever and inflammation in many parts, and the strength fails; emaciation, cramps, palsy and death may ensue at greater or less time, usually in a few weeks. Ptyalism, mercurial erythema, mercurial fever, mercurial or "fever" sores, mercurial sore eyes, etc., are effects of mercury well known. A peculiar fetid odor, caused by the action of mercury on animal tissue, is a very notable characteristic.

The different compounds and preparations of mercury, as also the different chemical forms of its use, such as calomel, red precipitate (oxide), white precipitate, nitrate, sulphate and cyanide of mercury, are all poisonous, and

evince many of the symptoms enumerated, as well as others additional. These forms of the mercurials are, however, not very frequently used with criminal intent.

A fatal dose of corrosive sublimate may be stated to be from three to five grains.

SIGNS ON THE DEAD BODY: As in the case of poisoning by arsenic, the traces of its action are most decided in the mouth, throat and stomach. In this case the mouth and throat are more affected than in poisoning with arsenic. The lesions of tissues noted in the effects of this poison in the living state may be cited as indicative of what may be found in the dead body. The rotten appearance of the mouth and throat will first attract the observer; then the offensiveness of the odor present. But the medical witness will have his more especial attention called to what he may discover in the stomach. In the slightest cases of the poisoning the mucous membrane of the stomach will show signs of inflammation, which are known by the red, now darker, and injected appearance of this tissue. The whole internal surface, from the mouth to the duodenum, will show these signs of inflammation. They may have been followed by softening and corrosion. All over there may be a white, slimy covering of the parts. Blood, more or less altered, will be found in clots, or perhaps extravasated, in appearances of ecchymosis, that may be displayed on the outer surface of the stomach, bowels and peritoneum. Oftentimes, when the surface (internal) of the stomach has a grayish appearance, there will, on parting the softened parts, be seen a red appearance of the tissue below. The coats of the stomach may be so much softened and decomposed that they may not have consistence sufficient to be lifted up from the body of the stomach.

Appearances like these will be seen in the duodenum and small intestines, and even in the large intestines.

Sometimes the corrosion will appear in patches. There may be sections that seem free, while others are far gone into disorganization.

The stomach, as is the case when arsenic has been the poison, will sometimes be found perforated. But mercury is also an antiseptic, and so, although the seemingly rotten state of the mouth and throat where the air is in contact is so observable, yet this putrid state is not so common in the stomach or the bowels. The signs of inflammation are much more obvious than those of gangrene. When the inflammation has run very high, there will be ulcerations, however, if the case is in any way of a chronic character. These ulcers may be found in the stomach and all parts of the small and large intestines.

Chemical Tests.

Corrosive sublimate may be entirely dissipated by heat. It first melts, and then volatilizes into a white vapor, leaving no residuum if pure. Thus, unlike arsenic, it *melts* before subliming. The condensation of this vapor forms crystals of a stellated, prismatic form.

The reactions are various. Iodide of potassium makes with it a beautiful scarlet. Potash alone with it produces a pretty yellow color. Sulphide of ammonium makes with it a black compound. Clear ammonia does not alter its color.

Corrosive sublimate may be decomposed into its two respective elements by fusing with dried carbonate of soda, when a sublimate of quicksilver will be made in globules.

A watery solution of corrosive sublimate evaporated on a glass slide will yield slender, opaque, silky prisms. When a weak solution of iodide of potassium is dropped

on these prisms, they turn beautifully scarlet. Thus this experiment identifies the mercury.

Tests in Organic Liquids.

Filtration of the liquids is necessary to free them from insoluble portions. Then the latter should be pressed, dried and retained for separate analysis. The liquid portion, being now ready for manipulation, is to be slightly acidulated with muriatic acid, and after warming it, if a slip of clean, bright copper foil be thrust into it, and mercury be present, the copper will be immediately coated with mercury, presenting a silver-bright appearance. Remaining so a few hours, the thickness of the deposit will be an index to the quantity of mercury present.

If the quantity of corrosive sublimate present in any fluid of the body be considerable, it may be removed by means of ether. The drug being soluble in ether, and this being of easy evaporation, it is only necessary to digest the fluid supposed to contain the mercury in the ether, and then, after settling, decanting and evaporating, the mercury will remain behind in this evaporation, unless too much heat be used, and will show itself in delicate, silk-like prisms.

It is to be borne in mind that mercury may, by this ether process, be displaced from arsenic or any other mineral not soluble in ether.

In examining the body, it should be noted in all chronic poisoning with mercury, that this substance is often found locked up in glands and provisional cells composed of fat or cellular tissue. All indications of this should be noted and looked after. In such cases the mercury may be easily separated mechanically, and by use of water to wash away soft, light substances.

Tests for Mercury in Organic Solids.

Substances for analysis such as the liver or kidneys admit of a method for testing the presence of mercury in the following way: Taking four to six ounces of the substance and drying, it is to be broken up and then boiled in a fluid of one part of pure muriatic acid to four of distilled water, till all is dissolved. Then the acid liquor is to be strained through linen, and the residue pressed. The liquid should now be concentrated by gentle heat to say one-half the bulk, and then tested for mercury by immersion, while still hot, of a gauze or foil of bright copper. The mercury, if present, will now gather on the copper with a facility proportioned to the amount present, say within ten minutes to several hours. Its gray or silvery appearance is readily recognized.

The glands are very likely to contain mercury, if it had been administered for some time before, and these can be treated in the same way as just stated.

The presence of mercury, however, does not always, nor yet ever *certainly*, determine that it was received by the body in corrosive form. Corroborative testimony must be had to make a case. In this particular an account must be had of the symptoms present before death and the condition of the tissues as to their state of corrosion.

Questions arise in Medical Jurisprudence as to the possibility of death occurring from reaction of mercury that has lain dormant in the system. In this particular there is some diversity of opinion. A very interesting case is in point, given by Dr. Beck, and is as follows:

"Jane Butterfield was tried at Corydon, England, in August, 1775, for the murder of Mr. Scawan. It appeared that she had resided with him for many years as his mistress. He had been salivated with a quack medicine

from the beginning till the middle of April. After that it ceased, and his health had decidedly improved. But in the middle of June he was again attacked with severe salivation and its consequences—sloughs formed, and he died some weeks after.

“Against the prisoner it was urged that the last sickness must have originated from the administration of corrosive sublimate in small doses, and that the previous medicine could not have induced these fatal consequences. Mr. Young and Dr. Sanders, as witnesses for the prosecution, deposed that they had never known a case of salivation to recur after such an interval.

“For the prisoner, on the other hand, Mr. Broomfield, surgeon of St. George’s Hospital, testified that he had repeatedly seen cases in which the salivation had returned, after every effort had been made to evacuate the mercury from the system; that in one instance the interval had been three months, and that one of his patients was attacked periodically at intervals of from one to six months.”

It appears, also, that another London hospital surgeon (Dr. Howard) confirmed this evidence of Dr. Broomfield. Speaking of the soluble character of mercury and its liability of reviving its poisonous effects at long intervals, he stated that he had known fifty cases of persons that had been discharged from the Lock Hospital free from salivation, and yet, on exposure, from cold or some other cause, they were again affected by the dormant mercury. In corroboration of this holding, in regard to the nature of this poisoning, there is the testimony of such eminent men as Drs. Mead, Male, Hamilton, Bennet, Gordon, Smith and many others.

These facts have an important interest, therefore, in a medico-legal bearing, and should be noted.

ANTIMONY.

The form in which antimony is used as a poison for criminal intent is its popular tartrate, or *tartar emetic*. But the results of its use are uncertain, since it is so liable to occasion vomiting, which defeats its destructive power. Hence, it is far less frequently employed as a poison than several other drugs. A poisonous dose, if it be retained, is from five to twenty grains.

Chloride or butter of antimony is a violent corrosive poison, more destructive than the tartrate. But, being more rarely in use as a medicine, is avoided when poisoning is intended on account of the suspicion that is likely to be occasioned in its procurement.

SYMPTOMS: Rough metallic taste, nausea, copious vomiting, hiccough, pain and heat in the epigastrium, retching, abdominal colic, inflation of bowels, copious purging, faintness, quick but small pulse, difficult breathing, vertigo, syncope, cramps in the stomach and legs, convulsions, prostration and death constitute its chief symptoms.

SIGNS AFTER DEATH: The mucous membrane of the stomach will have signs of great irritation and inflammation, by its red, thickened and sometimes corroded appearance. The duodenum will probably be found in a similar state, and also, not unlikely, the small intestines likewise.

The lungs may also be found to have been inflamed, and to be congested. The brain is sometimes affected by the poison, and will have serous effusion.

To sum up the signs of the poison, they will be found to be mostly confined to the stomach, intestines and lungs.

CHEMICAL TESTS: Caustic potash produces a white precipitate; if the solution of potash is strong, this is an oxide of antimony. Strong lime-water has the same effect.

A weak solution of muriatic acid produces a white precipitate; but if strengthened, it then takes up the precipitate again.

Infusion of nut-galls produces a dirty, yellowish-white precipitate, but is not reliable for more than a corroborating test.

The sulphureted hydrogen test is the best. Passed through a solution that contains only one-eighth of a grain of antimony, it produces an orange color. If the solution be now heated, the orange red is precipitated.

Astringent decoctions of oak, and other barks that contain tannin, will remove tartrate of antimony from animal tissues. The compounds so formed are difficult of solution afterward.

Turner's process for treating animal fluids that are suspected of containing antimony is as follows, mainly: In a proper vessel the suspected fluids are treated with solutions of muriatic and tartaric acids. The former coagulates the various animal substances that may be present, while the latter possesses the property of readily dissolving all precipitates formed by reagents with tartrate of antimony, except only that caused by sulphureted hydrogen. The fluid now so prepared is to be filtered, and a sulphuret formed and collected in the usual way. This may now be placed in a horizontal tube and a continued current of hydrogen gas passed through it. To conduct this proceeding, one end of the tube should, by means of a cork, be connected with a vessel in which the hydrogen is generated, and the other should dip into water, for separation of the hydrogen and exclusion of atmosphere. The portion of the tube holding the material operated upon is to be heated by means of a spirit-lamp while the hydrogen passes through. Of course the tube is bent at the ends to dip into the generator and receiver, and has also a section of greater diameter inter-

posed where the material is placed and heat is applied; this is arranged by means of perforated corks.

The result of this process is the production of metallic antimony, if the latter proceeding be conducted gently; but if the gas is forced strongly, the antimony may be sublimed.

This process may detect a tenth part of a grain in the tube.

LEAD.

Lead, as a poison, is in the form of acetate (*sugar of lead*), but it is, by no means, of much virulency. Yet in large doses, as from one to two ounces of the acetate, it acts poisonously, if retained in the system. Thirty to forty grains of the salt have been given, in divided doses, in a day without its producing any inconvenience. Still it may be, and has been, used with criminal intent, and therefore something should be known of the means of detecting its presence.

SYMPTOMS: A dose of one or two ounces of sugar of lead will be found attended by a burning, pricking sensation in the throat, notable also with the presence of dryness of the tongue and throat. In an indefinite time thereafter, there will be a hardness over the region of the stomach and bowels, with more or less colicky pain that may be intermittent. Unlike the case of the action of arsenic and mercury, pressure upon the stomach or bowels gives relief to the pain. The bowels are constipated. If the feces are voided, they are usually dark, owing to the change of the lead from an acetate to a sulphide. The skin is cold, and there is much prostration of strength. There may be cramps of the legs, particularly of the calves, and a notable pain in the inside of the thigh. Paralysis is occasionally caused by the poison, and sometimes other nervous disturbances.

APPEARANCES IN THE DEAD BODY: It appears, since the poisonous effects of lead are so uncertain, that oft-times no bad effects follow on taking considerable quantities of sugar of lead; while at other times comparatively small quantities have been known to produce speedily fatal effects. Some contingencies that are not yet understood may be involved. This has become more probable from the differences that are noticeable of its effects on the internal parts to be discovered in post-mortem examinations. In some cases, where the general symptoms were such, and other circumstances corroborating, that there was no doubt but that lead poisoning was the trouble, post-mortem examinations gave no evidence of poisoning. On the other hand, persons whose symptoms generally were similar presented, on examinations of their bodies after death, very decided indications of the action of a corrosive poison. Thus the mucous membrane was found inflamed, excoriated, and, in patches, corroded.

These circumstances have led to the supposition that some chemical change in the compounds of the lead used had occurred in these instances—where the evidence of a corrosive poison existed. Thus the theory has been advanced that the acetate is changed into a carbonate. This idea seems to have received corroborations in the fact that the carbonate of lead is much more certain to produce the signs of a corrosive poison. It appears, too, that the disease called *painter's colic* is caused by the white lead (carbonate) used by painters. In this view of the matter, the experiments of Dr. A. T. Thomson with the different chemical compounds of lead have apparently brought in new light. He found that those salts of lead that are readily convertible into carbonate are more poisonous than those that are not. Thus the subacetate and citrate, which have a powerful affinity for carbon,

and take it even out of the air, are active poisons; and these preparations of lead produce lesions of the stomach and bowels in their poisoning effects.

CHEMICAL TESTS: Powdered acetate of lead heated in a reduction-tube melts, and then becomes solid again; then it melts once more and acquires a dark color, giving off vapors of acetic acid, easily recognizable by the odor and reaction on litmus paper. This leaves a black mass in the tube, that consists of carbon and metallic lead. No sublimate is formed in this process.

The solution of acetate of lead dropped into a solution of iodide of potassium produces a most beautiful yellow color. This iodine test, therefore, is a valuable one, as there are few animal tissues or substances in the alimentary tract containing acetate of lead but that, on the contact of the solution of potassium iodide, will show more or less of this yellow product.

Sugar of lead dropped into water holding sulphureted hydrogen or sulphide of ammonium immediately turns black.

Solution of sugar of lead boiled in a test-tube with sulphuric acid yields its acetic acid, which is known, as it escapes, by its odor.

These different tests, in corroboration, prove the presence of sugar of lead.

But the sulphate of soda test is thought to be the most unequivocal one for sugar of lead. It causes a white precipitate that can not be confounded with any other, except sulphate of baryta, and, as there is no chance for the presence of barytes in a watery solution, this makes no exception.

COPPER.

The salts of copper are all poisonous; but two of them, namely, the sulphate (blue vitriol) and the subacetate (verdigris), are the most commonly known, and are quite the most liable to be used as poisons. Pure copper, like all other metals in pure state, is not poisonous.

SYMPTOMS: When animal or vegetable products, such as milk, meat, potatoes, coffee, tea, beer, or any other food substances that are not sour, are eaten after exposure to contact with clean copper vessels, no bad effects have been traced by careful observation. Nor are articles, when even fermented a little, ever likely to do mischief on account of having been held in clean copper vessels. But if the copper is coated, as it is very liable to be, with an oxide or carbonate, showing a dark or green, dirty appearance, then they are liable to do harm, because these rusts of copper are poisonous. This rust is mostly verdigris. Verdigris may kill in doses of a few grains; blue vitriol in doses of one or two ounces.

In treating of the symptoms of poisoning with copper, it is unnecessary to go into details about the effects of the different compounds of this metal, because they all produce very nearly the same symptoms. These are the common coppery taste in the mouth; acrid, styptic impression on the tongue, occasioning a sense of strangling and a free flow of saliva; nausea and vomiting; retching, or vain and continued disposition to vomit. Then comes pain in the stomach, attended with gripings and cramps. Vomiting and purging are disposed to be simultaneous. There is thirst, difficulty of breathing, faintness and syncope. A blue circle is noticeable around the eyes, and what is regarded as a distinguishing symptom is jaundice.

POST-MORTEM APPEARANCES: The appearances of the internal parts, in cases of poisoning with copper, are like those produced by the other corrosive poisons in all the signs of inflammation, abrasion, softening, thickening and ulceration of the coats of the stomach and bowels. The matters, as to physical appearances, to be looked for are the copper colors this metal leaves upon the tissues. These are green of various shades, and blue.

If the death by poisoning from copper be sudden, there will be hardly any trace of its effects to be detected, except the reddened appearances caused by the irritation.

CHEMICAL TESTS: The tests for copper when in solution are:

1. Ammonia gives a blue precipitate, but when added in excess then the material thrown down will be redissolved, and the blue color will be put upon the solution, and is a very beautiful color, if not changed by other agencies present.

2. Sulphureted hydrogen gas causes a brownish-black precipitate (sulphuret of copper).

3. Ferro-cyanate of potash gives a fine brown or claret color precipitate, when even the copper is in very minute quantity. When the copper is in but a slight trace, then the color is more red or lighter red. This, therefore, is one of the most delicate tests for copper. And when the solution is colored by ammonia, this testing agent turns the color violet.

4. A bright iron surface, as the blade of a knife affords, will, if held in the copper solution when acidulated with sulphuric acid, speedily be covered by a copper film.

5. Caustic potash produces a sky-blue precipitate, which is the hydrated peroxide of copper.

6. Adding to the solution a few drops of ammonia, then the oxide of arsenic makes an apple-green precipitate (arsenite of copper).

ZINC.

Zinc is very seldom used for criminal intent, because none of its preparations act fatally in sufficiently small doses; and, besides, all of them being so promptly emetic in properties, they will not remain in the stomach long enough to kill. The sulphate and chlorate of zinc are the popular forms in which they occur as drugs in the market.

Post-mortem appearances need not receive attention here, since the occasions for such examinations are not likely to occur.

The use of the sulphates and chlorates of zinc may involve cases of malpractice in medicine, and the chemical tests and symptoms may not be without some little importance here.

The symptoms are already somewhat indicated. They comprise the peculiar metallic taste of zinc, seldom mistaken; severe nausea, retching, vomiting, cramp, burning in the stomach and painful sense of constriction in the stomach and bowels, strangury, convulsions, hypercatharsis, palsy and death. The main characteristics of the symptoms are much like those of poisoning with lead.

The chemical tests will be dependent on the medicines that may have been given.

Sulphate of zinc is very soluble. As found in commerce it is seldom pure, being combined with sulphate of iron. This affects the chemical tests.

Pure sulphate of zinc is robbed of its sulphur by the caustic alkalies, and the oxide of zinc is precipitated by them.

Prussiate of potash causes a white precipitate from pure chloride of zinc solution; if iron be present, it makes the color blue in this test.

Sulphureted hydrogen gives a white precipitate from both pure and impure solutions.

VEGETABLE AND ANIMAL ACRO-NARCOTIC POISONS.

CHAPTER X.

OBSERVATION: The list of articles furnished by the vegetable and animal kingdoms that may be denominated as poisons, like that of the mineral kingdom, is large, but, as in this last named, the greater part of the poisonous agents are not used for criminal purposes, and also are not likely to be the occasion for suits for malpractice; therefore, it is necessary only to treat here of such articles as have importance in these respects.

The object that leads to the use of some of the less violent agents, and in which, in the ordinary use of them, entire safety is recognized, is the procuring of abortion; and hence such articles come properly into the list of articles needing to be considered here.

ABORTIVES.

SAVIN: The acrid volatile oil of savin is powerful in its action on the human system, and is recognized as possessing a special property for action on the uterus, and is hence a frequently employed agent for criminal purposes in this way. Its *symptoms* produced are: violent pain in the abdomen, in the region of the uterus; vomiting, protracted nausea, griping pain in the bowels, strangury; down-bearing pains in the abdomen, or disposition for voiding; passage of blood from the vagina, abortion, convulsions and death.

Signs after Death: The throat, œsophagus and stomach are found with indications of violent action of an irritant. There is redness and injection. The intestines and kidneys evince these signs, also, but in a less degree. The uterus, even when an abortion may not have been produced, is found injected, and the inner coats are of purplish red or dark appearance. When abortion has occurred, the signs are very evident.

Some physicians are of the opinion that savin has no specific abortive properties, and that it proves such only by its irritating effects; but the majority are of different views. It is certain that this drug is one of those most frequently resorted to for procuring abortion.

ERGOT: This, probably, is the drug most generally employed as an abortive; and, although some have disputed its possession of specific properties of this character, the profession not only generally concede it, but pronounce it to be powerful and certain in this property. It appears to show its ecbolie or abortive properties on other animals, such as cattle, horses, dogs, cats, etc., among which females with young have been subjected to abortion by the use thereof.

Symptoms: The symptoms produced by the action of ergot prove it to be poisonous, independent of simply the irritation it gives rise to, or its action on the uterus, since it is found to produce not only constitutional effects upon the mother, but to affect the child also in its constitution; furthermore, it will poison males and females alike where there are no liabilities for abortive effects.

In doses of from half a dram to two drams, the powder of ergot gives rise to dryness of the mouth and throat, thirst, aversion to food, nausea and vomiting; pain in the abdomen, and also the head; stupor; dilatation of the pupils; purging; tenesmus; expulsive pains; discharge of blood from the vagina; abortion; death.

Detection: When the poison results in abortion, the suspicion of its presence in the system generally leads to efforts for its detection. This is not a very easy matter; for, while the abortion itself may be somewhat easily detected, the question whether ergot produced it in any given case is hard to determine.

The signs of abortion itself, given by Dr. Shroff, of Madras, India, as appearing in 306 cases he examined in the hospital in two years, and comprising observations of the cases from the time of delivery up to fourteen days after, were: relaxation of the vulva and vagina; mouth of the uterus patulous; in early stages lochial secretion, followed later on with a mucous secretion having the peculiar odor common to women in the parturient state. With these there were also the evidences of distension of the breasts—a flow of milk on pressure, and a knotty feeling in the breasts; a general anæmic state of the body, noted by paleness and relaxation; sunken eyes. Excited pulse may be present in the anæmic state, and a state of restlessness even when prostration may be characteristic. Yet a languor and exhausted appearance is more common.

Among the aberrant symptoms produced by ergot may be noted an uneasy stinging sensation in the feet, burning sensation in the hands, fingers contracted, cardialgia, foaming at the mouth, stiffness of the limbs and gangrene.

Tissot, in a paper in the "Philosophical Transactions," Vol. XI, p. 758, classes the symptoms of poisoning with ergot into two divisions—the *spasmodic* and the *gangrenous*. In this report of his, the cases in account begin as far back as 1596.

Convulsions in a case of poisoning by ergot are regarded as signs of a prospectively fatal termination.

In the matter of the proofs as to poisoning by ergot, as presented on the dead body, the case as already stated

is not an easy one to determine for certainty. One fact may be observed, that the body after poisoning with ergot is very greatly disposed to gangrene or mortification. There are, however, some points that can be taken into the consideration of the case which, taken together with the facts presented by the post-mortem, may be of value in determining the presence of ergot. Thus the proof of the fact of administration of large doses: any circumstantial or other pertinent avowals of the deceased made at any time during her suffering, or statements of others. Such statements, while not always valid in courts of law, may yet be taken by a professional man as corroborative of the facts he may find in his examination of the body, and help to satisfy himself.

It is improbable that a sufficient amount of ergot can be traced or found in a dead body, where death may have resulted from its use, to determine its agency in the case with sufficiency of assurance that poisoning by ergot was the cause.

The following facts in reference to its physical and chemical properties may be remembered: The powder of ergot has a faint, fishy odor, which is more especially observed when rubbed in a solution of potash. The ergot is soluble in potash solution, acquiring with it a dingy-red color. In the form of tincture in ether or alcohol, the peculiar fishy odor is distinctly notable when treated with potash.

Sometimes there may be found in the coat of the stomach some pink-red colored specks that are caused by particles of ergot. These may be identified occasionally with the microscope. On evaporation of a solution of the contents of the stomach or duodenum, there may appear traces of the presence of ergot, known by smell and color; and possibly particles may be found that can be identified by use of the microscope.

Taylor sums up his remarks on the proofs of the presence of ergot and its cause of death in the following words: "It is not probable that a sufficient quantity of this substance [ergot] will be found in the body of a person to whom it is alleged to have been given to allow of the separation of *ecboline* [the peculiar principle of ergot]. The medical jurist must rely upon the physical properties of the fungus, if he can obtain any of it. A spectral examination of the red alkaline solution of coloring matter presents nothing characteristic. The dry powder, heated in a reduction-tube, yields nitrogen as ammonia and sulphur as sulphureted hydrogen, discoverable by red litmus and lead paper. Old samples smell strongly of ammonia, and often contain acari." But the facts stand against these matters that *the same appearances are found without the presence of ergot* in such examinations.

The medical witness can not, therefore, testify definitely to anything by analysis of the contents of the stomach as to what the dead body may contain, taken alone. And when all the facts are brought together, the case may still remain more or less obscure.

There is one more particular that is worthy of notation in regard to the use of ergot as a parturient agency. And, as cases sometimes come into court concerning malpractice, it is well to mention some facts in the premises. They are the proofs that are found in the liability of ergot causing the death of the child. In all cases where the advance of pregnancy had been such as to make this proof of avail, it will be well, perhaps, to make notings of the proofs thus afforded. This subject of the effect of ergot upon the fœtus was at one time a matter of earnest discussion, and the question became so grave in France that the French Government referred the matter to the Academy of Medicine in 1845. The reports of Drs. McClintock and Hardy went to show that out of thirty cases

where ergot was tested twenty children were born dead. But other testimony came in conflict, and later on Dr. U. West read a paper in the London Obstetrical Society, July, 1861, that between December, 1855, and June, 1861, he had attended 734 obstetric cases, and in 172 of these ergot was given, and 173 children were born under the influence of the drug (there being twins in one case), and but five of these were still-born.

These conflicting facts thus make the testimony derived from the effects of the drug upon the fœtus of small value. Still, as a matter of fact, it may here be stated that it is now pretty well known by many persons that the influence of ergot upon the fœtus depends very greatly, if not entirely, upon the parturient stage in which it is given. Thus ergot, when given late in the parturient labor, will not effect the fœtus, while, on the other hand, it may, when given early, or when labor has not fully set in.

There are other drugs that have some reputation as abortives, but they are not in the category of agents used for criminal purposes, and need not be treated of here.

ACRO-NARCOTICS.

VERATRUM: The products of the several varieties of hellebore, as those of the black, white and green, are poisonous, and have been used to destroy life in rare instances.

Symptoms: Veratrum locally produces signs of an irritant. When taken into the stomach it proves irritating in its effects, and occasions nausea, vomiting and purging, and these effects are attended with severe pain and distress in the bowels. Its action on the nervous system is known by the great depression or sedative effect it pro-

duces on the whole system. The heart and arteries are abated in action, and the pulse sinks, sometimes so as to be imperceptible, and is always slower in beats than what is natural.

Detection: Hydrochloric acid diluted, with heat applied, produces a dingy red tint. Strong nitric acid gives a light red color, becoming yellow on exposure. Sulphuric acid, with gentle heat, strikes a rich pink color, which is faded by chlorine, but not by chloride of tin. Strong sulphuric acid causes at first a yellow color, but which, on heating, becomes a deep red.

In its substance, as found in the stores, it is a whitish powder—a little likely to be brownish in appearance—that is scarcely soluble in water, even when heated; but alcohol, ether and benzole bring it into solution. The acids generally dissolve it and produce salts, but these are not crystalline.

COLCHICUM: This is a poison sometimes, though rarely, employed for criminal purposes. The records of the courts, however, present instances of trials of criminals who used this drug as a poison. These have, seemingly, been more common in England than in America.

Symptoms: The symptoms are pretty decided: there is burning pain in the mouth, throat and stomach, attended by intense thirst, violent vomiting and purging, followed by great exhaustion, coldness and nervous depression, but there are no convulsions or any loss of consciousness. Death seems to be caused principally by exhaustion, and occurs—in full poisonous doses—in the course of forty-eight hours. The drug is usually given in tincture, and popularly as wine of colchicum, of which three to six drams may prove fatal.

Post-mortem: The signs discovered by dissection are not such as are usually present in poisoning with the acrid drugs. The evidence of inflammation is not common. There is no corrosion, but extravasation of blood has been detected, and sometimes red spots are seen on the stomach. Sometimes the mucous membrane may be found softened, and it is seen everywhere to be thickly covered with mucus. The lungs are gorged with black blood; the plura, also. The heart is flabby, and contains black blood.

The chemical tests are not well marked, and but few records are found on the subject.

CARBOLIC ACID: This powerful drug is poisonous in large doses, or when of full strength. It is, however, not in use as a means for destroying human life, as its administration could not be easily effected stealthily. It may, however, come up as a subject of investigation in cases of alleged malpractice.

Symptoms: The symptoms of this article in fatal doses are very like those of the concentrated alkalis, such as potash and soda, and are local—that is, they are to be detected mostly on those parts that have been exposed directly to its action. Hence, search is to be made in the mouth, throat and stomach, and here are evinced the signs of the action of a severe corrosive.

Detection is found by its odor. Molybdic acid is regarded as the best means for its chemical detection.

CROTON OIL: It is not common that this drug, though so powerful and speedy in its effects as a poison, and also requiring a dose so small, is found to have been the means of willful murder, or even suicide.

Symptoms: No drug, perhaps, produces symptoms so nearly like those of cholera as croton oil; and no descrip-

tion need here be given therefor. There is hardly any difference in the two cases at any stage, from beginning to end; the nausea, vomiting, purging, collapse and death are parallel. So, also, in the appearance of the matters ejected.

CANTHARIDES: It is not frequent that cantharides are taken with intent to kill, yet they are given for other criminal intent, and, withal, require attention in a medico-legal inquiry.

Symptoms: Cantharides, or Spanish flies, produce, when taken internally in doses of one or two drams, speedily, great irritation and burning in the mouth, throat and stomach. Vomiting soon sets in, and the matters thrown up are bloody mucus. There is great thirst and dryness of the mouth and fauces. Afterward a great irritation is felt in the bladder and urinary passages, attended with an incessant desire to void urine, while but a small quantity comes, which is bloody, and produces great pain in passage. With this there is pain in the loins, proving the action of the poison on the kidneys.

There is great pain and griping in the bowels, attended with purging of bloody mucus. In what is ejected from the bowels and stomach the green and copper-colored powder of cantharides may be noticed.

Violent priapism and almost uncontrollable venereal propensity are very marked symptoms of this poison. The genital organs become painful and swollen. These symptoms occur alike in the male and female, in so far as the irritation of the organs and the venereal propensity are concerned; and the priapism of the male has its correspondent signs in the hardening and swelling of the clitoris in the female. There is ever a liability to strangury and cystitis.

The symptoms of the poisoning become very distressing, for the inflammation produced on all the mucous surface is great, and the pain and distress accordingly. Faintness, convulsions and death are the final effects.

The object for which the poison is usually given when criminally used is to produce erotic or amorous inclinations. But in this intent the matter is almost always overreached by the excess of the dose or urgency of its use, and so the violent symptoms supervene instead. It is its more protracted and less excessive use that develops this effect of the drug.

Externally applied, the powder or tincture is very irritating, and will, in a short time, occasion local inflammation, resulting in effusion that occasions blistering. The blisters are clear and filled with serum. The sores thus produced are distressing and painful. Sometimes they are difficult in healing.

Post-mortem Appearances: Dissections prove the mucous surfaces, especially of the alimentary canal and urinary passages, to be highly inflamed. The mucous membrane will be found detached, like as is the cuticle in external application. The surface of the stomach and bowels appears raw and corroded; so, also, that of the bladder and urethra. The kidneys are highly inflamed, and, in chronic cases, ulcerated. The brain is injected and full of blood—sometimes extravasated. Death usually follows a fatal dose, which is variable, as from a dram to an ounce of the tincture, or twenty grains to a dram or more of the powder, in from one day to three or four days.

Detection: The process for detecting cantharides as a poison, when searched for in the dead body, is first to endeavor to find the presence of the powdered particles, which can usually be done when the drug is given in substance. A portion of the contents of the stomach or bowels is to be taken and spread thinly on a plate of

glass and left to dry. When dry, the shiny particles can be detected by the natural sight, or by use of a lens, on one or the other side of the glass. The powder of cantharides is not soluble in water, and so the contents of the stomach may be rinsed in water, and search made in the washings for the particles of the powder, which may be easily detected by a microscope.

When the tincture has been used, this method is not sufficient; and in cases, therefore, where the particles can not be detected, the proceeding may be by digesting the parts or substances in ether, which takes up the cantharidine, that may be detected, after the ether is evaporated, by the application of the extract to the skin of a rabbit, or other delicate skinned animal, and ascertaining if marked irritation or blistering is produced. The crystals of cantharidine may be discovered, also, if the process of drying is successfully conducted. To obtain the crystals the fatty materials of the solution must be removed. To do this the dried or reduced product of the evaporation should be washed in sulphide of carbon, which dissolves the fat and not the cantharidine. Chloroform is a still better solvent for cantharidine, and may be taken instead.

NOTE: There are various other drugs that are enumerated in works on Medical Jurisprudence in the class of acro-narcotic poisons that are never the subjects of testimony, and ought not to encumber a work of this kind, such as gamboge, aloes, jalap, lobelia, gelsemium, etc. This fact has its greatest significance in showing how amazingly authors are apt to follow antecedent writers. In earlier ages, when less was known of certain drugs, they were placed in the list of poisons, and subsequent writers have followed suit without taking the trouble of investigation. Thus it is that Beck, Taylor and others have

continued the earlier impressions of the deadly effects of lobelia. Dr. Beck, in his "Medical Jurisprudence," even in late editions, gives a history of the trial of Samuel Thomson for the murder, by lobelia, of Ezra Lovett three-quarters of a century ago. Lobelia is now employed in all countries, and scores of thousands of cases attest the safety of its use, although this author stated that thousands of individuals had been murdered by it. The case is just so with ricinus. Orfila, in his "Toxicology," pronounces this plant very poisonous, saying that the seeds killed a young lady who had eaten them. But who is it now that has any fear of castor oil, the most common household medicine, which is its active purgative principle expressed?

NEUROTIC OR CEREBRAL POISONS—
NARCOTICS.

CHAPTER XI.

OPIUM AND ITS SALTS.

THIS drug, in some of its preparations, most commonly *morphine*, is a very common agent used to destroy life in purposes of murder and suicide. It is a happy circumstance, therefore, for jurisprudence that its effects are not very easily disguised.

Symptoms: It is in the use of full doses, such as are likely to occasion death, that the effects of the drug are to be noted. These are very much the same whether the form of its use be in the crude opium in substance; its tincture, as laudanum; or its salts, in morphine—whether sulphate, acetate or hydrochlorate. But the doses necessary to destroy life are different—thus: for an adult, five to twenty grains of opium, two drams to an ounce of laudanum, and five to twenty grains of morphine. The fatality of the dose is largely dependent upon circumstances. Some constitutions bear its power much better naturally than others. Then the habits of life modify it. The system may become so accustomed to its use as to bear enormous quantities of it with impunity. On the other hand, life has been destroyed with less than a full grain of morphia. The time varies considerably in which its fatal effects are developed, running thus from one to thirty hours. Infants may be speedily destroyed by very small doses; they tolerate much less of it in proportion, as compared with other powerful agents.

The more notable symptoms of a fatal dose are the following: sense of hardness in the stomach, giddiness, drowsiness, sleepiness, stupor, insensibility and death. With these there may be stertorous breathing, coma, vomiting, headache, contraction, and afterward dilatation, of the pupils; slow, but full pulse; coldness and palor of skin; profuse perspiration, and, loss of power of deglutition.

The eyes are mostly shut, and often there seems to be a calm repose, and the subject goes off into a perpetual sleep, while the signs of life gradually disappear till death supervenes. Before death the muscles frequently are observed to relax permanently; the chin drops; the arms and legs are passive; the sphincters relax, and all power departs. Occasionally there will occur a revival from the imminency of the symptoms, and then a relapse and exacerbation.

Constipation of the bowels and loss of appetite are symptoms of chronic opium poisoning. A very remarkable itching of the skin and prickling sensation is a symptom that is very likely to be present.

Absorption and Hypodermic Injection: Morphia injected into the veins, or put upon open places, as wounds or ulcers, will produce speedy effects—quite as much so as when taken by the mouth. Nor is the injection required to be thrown into the veins direct. It is simply necessary to inject the solution of morphia through the skin at any place into the loose cellular tissue, whence it is speedily absorbed. The quantity injected under the skin needs to be no larger than is necessary for the same results when taken by the mouth. In fresh wounds the quantity used may also be small for full effects. But in ulcers, more is required. Yet death does result when a sufficient quantity is thus placed into the circulation. It is absorbed by the veins. The nerves also receive a direct impression when thus applied.

Appearances after Death: In poisoning by opium and its salts, the stomach seems not to show the effects as much as other parts. Indeed, in many cases the stomach is found in a natural or healthy state. The brain and nerves are the theater of its action. In all cases the membranes and vessels of the brain are found more or less gorged with blood of dark appearance. The lungs, also, are found injected, red or dark. The heart is full, and its tissues injected. The liver and spleen show engorgement. The stomach and bowels have their coats injected, and the plura and peritoneum likewise—to a less extent, generally. The skin, in many cases, shows patches of livid color.

Extravasation of blood into the cavities is not common, although such cases have been found. But effusions of serum among the membranes of the brain is frequently seen. Dr. Christison reports four cases in which the blood was found coagulated; but generally the blood remains thin, and speedily runs into putrefaction. Bodies poisoned by opium or morphine also decompose rapidly.

In looking for the substance of the poison in the stomach and bowels, it will not always be detected. This is somewhat difficult to be accounted for when the proofs of its administration exist. That it should be absorbed is possible, and that it should be decomposed is also possible; but yet these suppositions are not entirely satisfactory.

CHEMICAL TESTS: For opium itself we have no ready chemical tests, and it must be judged of by its smell, taste and other physical properties, mostly.

In regard to the different salts of morphine, as of the sulphate, hydrochlorate, acetate, etc., and for the salts of other bases, as papaverine, narcotine, codeine, meconine, etc., the matter is different, and these severally have their tests.

Doubtless some of these latter may become formed in the system after the introduction of crude opium or laudanum, by contact with acids in the body. And as the object of poisoning with the opiate narcotics would be most likely sought in the use of the salts, on account of their greater convenience of administration, it is well to make efforts for their detection when the symptoms have indicated their presence.

When opium is to be tested for, the process must be conducted with the view of detecting some of its peculiar principles. The following was published by the late Professor Hare, of Philadelphia, as a process for detection by virtue of its meconic acid:

"To a fluid supposed to contain opium, add a small quantity of acetate of lead, and set aside for six or ten hours to precipitate the meconine, in the form of meconate of lead. Then, by means of a glass tube, let down a small quantity (a few drops) of sulphuric acid upon the precipitated mass. Then follow this by a like quantity of permuriate of iron. This produces a cherry-red color—the meconate of iron. The *rationale* of the process is that the sulphuric acid liberates the meconic acid from the lead, when the salt of iron attacks it and forms the color."

Christison has a delicate and satisfactory process for the detection of constituents of opium. It is as follows:

"1. If there be any solid matter, it is to be cut into small fragments; water is to be added, if necessary, then a little acetic acid to render the mixture acidulous, and when the whole mass has been well stirred, and has stood a few minutes, it is to be filtered and evaporated at a temperature somewhat below boiling, to the consistence of a moderately thick syrup. To this extract strong alcohol is to be gradually added, care being taken to break down any coagulum that may be formed, and, after boiling and cooling, the alcoholic solution is to be filtered.

The solution is then to be evaporated to the consistence of a thin syrup, and the residue dissolved in distilled water and filtered anew.

"2. Add now the solution of acetate of lead as long as it causes precipitation, filter and wash. The filtered fluid contains the morphia, and the precipitate on the filter contains meconic acid, united with the oxide of lead.

"3. The fluid part is to be treated with sulphureted hydrogen, to throw down any lead which may remain in solution. It is then to be filtered while cold, and evaporated sufficiently in a vapor bath. The solution in this state will sometimes be sufficiently pure for the application of the tests of morphine, but in many cases it is necessary, and in all advisable, to purify it still further. For this purpose, the fluid is to be precipitated with ammonia, and, the precipitate having been collected, washed and drained on a filter, the precipitate and portion of the filter to which it adheres are to be boiled in a little pure alcohol. The alcoholic solution, filtered, if necessary, will give by evaporation a crystalline residue, which becomes orange-red with nitric acid, and, when suspended in water, becomes blue with permuriate of iron. The latter property I have sometimes been unable to develop, when the former was presented characteristically.

"4. It is useful, however, to separate the meconic acid, also, because, as its properties are more delicate, I have repeatedly been able to detect it satisfactorily when I did not feel satisfied with the result of the search for morphia. Dr. Ure made the same remark in his evidence on the trial of Stewart and his wife. He detected the meconic acid, but could not separate the morphine. Suspend, therefore, in a little water the precipitate caused by the acetate of lead (paragraph 2), transmit sulphureted hydrogen till the whole precipitate is blackened, filter immediately without boiling, then boil, and, if necessary, filter

a second time. A great deal of the impurities thrown down by the acetate of lead will be separated with the sulphuret of lead, and the meconic acid is dissolved. But it requires, in general, further purification, which is best attained by again throwing it down with acetate of lead and repeating the steps of the present paragraph. The fluid is now to be concentrated by evaporation and subjected to the tests for meconic acid, more particularly to the action of perchloride of iron when the quantity is small. If there is evidently a considerable quantity of acid, a portion should be evaporated till it yields crystalline scales, which have always a yellowish tint, and these are to be heated in a tube to procure its arborescent crystalline sublimate. About a sixth of a grain of meconic acid, however, is required to try the latter test conveniently."—*Christison, p. 608.*

It may be observed that Christison states this to be founded on the method proposed by Lassaigne.

Special Tests for Morphia: When pure, morphia is in beautiful white crystals, which are varied in the different salts. In its simple state it crystallizes in hexahedral prisms, which are white, if pure. A solution of morphia in weakened muriatic acid, treated with weak ammonia, will yield crystals of various forms. When slowly produced, they are prismatic, with hexahedral forms. When heated on a plate of glass or platinum, the crystals of morphia melt, turn dark and burn like resin. If heated in a reduction tube, test paper will prove the vapor to contain ammonia.

Cold water scarcely dissolves any portion of pure morphia; but boiling water dissolves about one part in weight to a hundred parts of water. This insolubility of the pure morphia is the means of detecting it from its salts formed with the acids, as the sulphate, acetate, etc. It is not very soluble in ether or chloroform, and in this

it has its difference from narcotina. It is soluble in forty parts of alcohol to one of morphia. It is quite ready of solution in acetic ether; and, therefore, this becomes a most convenient test for its presence in animal fluids, from the use of crude opium or laudanum.

Morphia is very readily dissolved by all the acids, vegetable and mineral. It is without odor, but intensely bitter in taste.

Salts of Morphia detected from Strychnine: Strychnine is precipitated in crystals from its solution by sulphocyanide of potassa, ferrocyanide of potassa or chromate of potassa, and the salts of morphia are not.

PRUSSIC ACID.

This is the most fatal of all the poisons used for criminal purposes. Anhydrous or pure prussic (hydrocyanic) acid will destroy life in a dose of a quarter to one grain almost instantly, and is, hence, too quick for the usual purposes of murder, when the criminal desires to be away from the actual scene of his crime; but for suicide this powerful agent is a very common one.

Symptoms in Life: Prussic acid has a hot, bitter taste, and an odor like that of bitter almonds. In a few minutes after swallowing, and sometimes in a few seconds, the person taking a poisonous dose of it will suddenly become insensible; the eyes are fixed and glistening; the pupils dilated, and unaffected by light; the limbs are relaxed; the breathing, which may continue for a little while, is at long intervals; the pulse is imperceptible; and, generally, there are spontaneous passages of both the urine and feces.

There may be moaning and convulsive sobbing, stertorous gasping or spasmodic closure of the jaws. But death speedily puts an end to all these symptoms.

Appearances after Death: A first notice on approaching a body, dead from effects of prussic acid, is its distinct odor. This, however, disappears after a time, especially if the body is exposed to a current of air; and more especially, still, if it should have been wet with rain. Then, again, the odor may be concealed by stronger ones from other drugs. But this prussic acid smell is continuous in the viscera, sometimes for several days. Taylor reports a case of suicide where, on the opening of the stomach twenty-eight hours after death, the escaping vapors of prussic acid were so strong as to occasion dizziness of the inspectors.

The external signs are livid or violet color of the skin, blue nails, contraction of fingers and toes, foaming or froth at mouth, face pale and sometimes bloated, eyes open, fixed, glassy and staring, with pupils dilated.

Internally, it will be found that the venous blood is dark and liquid. The stomach and intestines are not likely to show signs of disturbance, except that the veins are congested. The liver, kidneys and spleen are likewise little expected to do so, except the veins being gorged with dark, thin blood. The heart and arteries are empty of blood mostly. The lungs are deep red, and somewhat frothy in the bronchia.

The brain shows the effects of the poison to be principally on the nervous system, and the other signs are consequences. The sinuses of the brain are effused with serum and fluid blood, and the substance of the brain is softened. The spasms and tetanus that characterize the symptoms before death corroborate the conclusion that the poison acts directly upon the nerves and destroys the life principle.

CHEMICAL TESTS: A very simple process may detect prussic acid if the test is made soon after death by this poison. The saliva, blood or any of the soft parts of the

body are to be placed in a jar or bottle, and a convex cover inverted over it, such as a saucer or watch-glass, having in the center a drop of the solution of nitrate of silver. The volatility of the prussic acid will, by its fumes rising from the vessel and meeting the nitrate solution, produce *cyanide of silver*, in the appearance of an opaque white film. The tests for cyanide of silver will then readily make the proof. Sometimes the cyanide forms in clusters of slender crystals of oblique terminations, detected by a microscope. But the reduction tube will test the cyanide by the production of cyanogen, which may be burned as it escapes, and so produce its beautiful rose-red flame, with its blue halo. But for proper effect, the cyanide must be well dried before placing it in the tube. By this test, the presence of prussic acid may be detected when in extremely small quantity.

Iron Test: A liquid suspected of containing prussic acid may be tested by dropping into it a small quantity of solution of potash and a solution of green sulphate of iron, which will precipitate a dirty greenish or brown substance. After shaking this for some minutes, add some dilute muriatic acid, and immediately the deep blue color of prussian blue appears; this is prussiate of iron.

Sulphur Test: Filter a solution suspected, and add a small quantity of bisulphide of ammonia; evaporate to produce the sulphocyanate of ammonia. With this a solution of persalt of iron produces a beautiful red, that is made to disappear by the addition of a solution of corrosive sublimate.

The odor of prussic acid is a test not to be disregarded in the beginning of the inspection of a body. This is so marked as to make at least very strong corroborative evidence. The acid being so very volatile, however, makes it uncertain whether this test will be of avail in an old

subject. Still, however, it has been detected in cases from ten to thirty hours after death.

CYANIDE OF POTASSIUM.

This is a poison of great power, causing death very speedily. Five to ten grains of it have been known to cause death in ten to fifteen minutes. But it appears not to be much used for criminal purposes; perhaps this may be because its effects, like those of prussic acid, are too speedy, and so leave no opportunity for retreat or covering the crime.

Symptoms: A bitter, cooling sensation is felt on the tongue at first, which is soon followed by a feeling of constriction and burning in the throat. The symptoms that then follow are very similar to those of prussic acid, which see. It is pretty evident that its poisonous effects are caused by prussic acid that is set free from the cyanide by its contact with acids in the system.

Post-mortem Appearances: These are also very similar to what were described as from prussic acid, even to the matter of the smell resembling that of the oil of bitter almonds, that is common to both.

Chemical Tests: The following are the tests for cyanide of potassium: (1) It is decomposed by all the acids; (2) the potash is precipitated from it by tartaric acid and chloride of platinum; (3) it is insoluble in alcohol; (4) it gives a white precipitate with nitrate of silver, which, when dried and heated, present all the properties of cyanide of silver; (5) prussian blue is produced by addition of protosulphate of iron and sulphuric acid.

FERROCYANIDE of potassium is not regarded as a poison, but is very like the simple *cyanide* in the liability of producing prussic acid by meeting with acids, and thus producing poisonous properties.

OIL OF BITTER ALMONDS.

The essential oil of bitter almonds, although used very extensively for flavoring confectioneries, is yet a fatal poison when taken in sufficient doses, and these are not large. One drop of the pure oil touched to the tongue of a cat will destroy life in a minute or two. It is almost equally fatal in a like dose to a man. Dr. Brodie touched a glass rod that had been dipped into a phial of the oil to his tongue, and found it to produce instantly most notable prostrating powers.

Symptoms: There is no doubt but that it is the properties of prussic acid in the essential oil of bitter almonds that produce its poisonous effects, since its symptoms are precisely like those following a poisonous dose of that drug.

Tests: The tests for this poison must be, in the main, those that apply to prussic acid, as it is all but certain that it is prussic acid that does the poisoning that follows the administration of oil of bitter almonds. The odor thereof is one test, and the history of the symptoms, if these can be gathered, must be taken into account.

NITRO-BENZOLE.

This drug is now used as a substitute for the oil of bitter almonds for perfuming confectioneries, as it answers the same purpose, and comes cheaper; but, like it, is poisonous, and, no doubt, may become the agent for criminal purposes. It is as yet a new drug in the market, but is rapidly growing into popular use.

Symptoms: It has been supposed that the symptoms that follow the poisonous dose of this article are similar to those of bitter almonds and prussic acid. But later investigations by some Prussian physicians have brought

out new facts which place a new value upon its symptoms. It is found that the effects are different in regard to the speedy insensibility that prussic acid produces. In this the mind may be clear for an hour or two, even when fatal doses are given; but then there will suddenly come on unconsciousness and the muscular cramps that characterize the prussic acid. Coma sets in at an uncertain period after stupor begins, but usually soon. The eyes are bright and glassy, and there is a prickling sensation at the root of the tongue, and not the burning stricture that characterizes the action of cyanide of potassium. In other respects the symptoms are much like those of the latter two poisons just treated of, and of prussic acid.

Tests and Appearances: The appearances found in the dead body prove the same venous engorgement that characterizes all the poisonous cyanides. In this case the heart will be found full of blood, and the superficial veins dark and full. The odor of nitro-benzole is the same as that of the others, but more persistent. Otherwise, dissection proves about the same effects.

Nitro-benzole is distinguished from the essential oil of bitter almonds by the following method: Take a plate and drop a little of each on separate spots, and apply strong sulphuric acid. The almonds oil acquires a crimson color, with a yellow border, while the other is not so changed.

ALCOHOLIC, ETHEREAL AND CHLORAL POISONS.

CHAPTER XII.

ALCOHOL.

ALCOHOL is not commonly used for criminal purposes, in view of any directly destructive effects, but, in the various intoxicative drinks, as whisky, brandy, etc., is employed to stupefy, bewilder and overpower individuals, so as to afford opportunity for wicked purposes, as seduction, rape and robbery.

Symptoms: The symptoms produced by alcoholic drinks are too well known to require description here, except as they may be important to contradistinguish them from those of other stupefying poisons. The odor may generally be a means of detection or discrimination. The symptoms on the living subject at first evince more excitement, giddiness and agitation of the mind. This is, at least, the case until the subject gets "*dead drunk*," when the same stupor and unconsciousness is present.

Signs on the Dead Body: In the main, it is found that the alcoholic poisons effect the stomach and bowels more than the others of this class do. The mucous membrane will be found to show signs of great inflammation; the surface appears in all shades of redness, from a pink (darker than in nature) to deep red and purple, or even blackness. This appearance is generally in blotches, but in aggravated cases the entire surface may be of the same appearance. The mucous membrane is softened, sometimes throughout.

But before proceeding now in any detail of the post-mortem appearances of the body in alcohol poisoning, it is proper to remark that at the present time these beverages are greatly drugged with strychnine, opium and other similar articles, and the appearances after death vary somewhat accordingly. Thus the gastric and enteric irritation and inflammation may not be so great, and the cerebral signs more prominent, as in cases resulting from the action of the more potent narcotics. The liver may be found hardened and yellow, when the spirit had been used in a protracted way.

Detection: In examining for alcohol, the attention may be directed first to the odor to be detected, unless the case is old. The next method is to take out the stomach, after topical inspection, and, placing it into a retort, the spirit is to be distilled therefrom by proper precaution. After a first distillation lime or potash may be placed with the water and fleshy portions, in order to disengage the alcohol and promote its distillation.

It must be observed, however, that after a lapse of some time the alcohol may have become absorbed or diffused from the stomach, and have even disappeared from the body by its volatile properties, so that the distillation will be of no avail.

ETHER.

Ether is not convenient for common use as a poison for criminal purposes, except by its vapor diffused in a close room where persons, on whom designs are proposed, may be sleeping. Otherwise than when in a state of sleep, the poisoning could not be accomplished.

Tests and Appearances: These are the same as for alcohol, only that the impression is of course less developed in the stomach and bowels, and more in the brain and lungs. Distillation is the method, also, for the discovery of its presence.

CHLOROFORM.

This article is by far the most commonly employed for criminal purposes when an agent is wanted to act by respiration. When diffused freely in the atmosphere of a room, and which may be readily done by its diffusibility, it will speedily cause insensibility to persons who breathe it. When taken into the lungs without mixture with air, the fumes of chloroform will produce unconsciousness in from six to ten minutes, and oftentimes death, also. A fatal portion varies from a few drams to as many ounces.

Symptoms: Chloroform is now very extensively employed by surgeons and dentists, and its symptoms are so well known that it would be superfluous to treat of them here.

Detection: It is pretty easy to discover chloroform in a body killed therewith, by its odor, which is very decided and peculiar. But, in addition, the process of distillation is to be resorted to. This is effected by procedure without water, by placing portions of the lungs or other parts in a flask and distilling by means of a water bath, at a temperature below that of boiling. If there be placed to the condensing tube, instead of cold, a spirit lamp, so as to heat the tube to redness, the chloroform will be decomposed, and hydrochloric acid will be found a product.

In the dissection, it will not be found that either the stomach or bowels show any signs of poisoning greater than the other viscera, because the poison is not usually taken in the stomach for the purpose of killing a person. It could not be thus administered in a quantity sufficient to destroy life without suspicion being occasioned. But the lungs will be found to be the chief place where the effects are to be traced. Congestion and inflammation are the usual signs. The brain also shows marked signs of its effects.

It is a matter of fact, however, that it is seldom that chloroform is employed for the purpose of killing, but rather (as in the case of the use of alcoholic beverages), to produce unconsciousness for purposes of criminal acts upon the person, or for robbery. The court records show the occurrence of many prosecutions brought against physicians and dentists, especially the latter, for alleged criminal practices under the power of chloroform. Occasions of its use have also been fraudulently improved upon by unprincipled persons subjected to its influence, and no one, therefore, should allow himself to bring a patient under its influence to the extent of unconsciousness without the presence of others. The avowing subject of the pretended crime has the benefit of her own testimony, which the statutes, for good intent, have environed with strong prejudices. Prudence is a bright jewel, and when men wish to possess jewels, they usually pay high considerations.

HYDRATE OF CHLORAL.

This is a drug brought into popular employment of late years. It occurs in market in the form of solid crystalline masses, and, as a medicine, is a substitute for opiates. In doses of from twenty to thirty grains it will operate as a sedative and anodyne without occasioning any excitement, and so meets with much favor; but, like chloroform, it is by no means free from danger in its use, even as a medicine. The disadvantage attending its use as a medicine also points out particulars that cast light on its character as a poison. This is the uncertainty as to its power of action in particular cases, and which, in the present state of our knowledge concerning the toxicological effects thereof, can not be determined in advance of its use. A criminally disposed person will prefer not to expose him-

self to danger of detection, and at the same time the risk of failing in his object, in employing an uncertain agency; probably, therefore, the chloral hydrate will not be brought much into use in this way. Nevertheless, the drug is one of great power over the nervous system, and every jurist ought to be well informed concerning its character.

Symptoms: The symptoms of this agent, when producing decided effects, are, first a sensation of drowsiness, soon followed by deep sleep, from which it is difficult to arouse the subject. There are signs of narcotic power—that is, the drug is not simply a sedative, soporific and anodyne, but it will effect the brain to some extent as opium and belladonna. A fatal dose is from one to two drams, or more; but a case is recorded in a British medical journal in which one hundred and sixty grains were given in a hospital by mistake to a middle-aged man, who yet recovered therefrom. Also, another case of a like dose of one hundred and sixty grains is reported in the same journal, September, 1878, in which a young lady swallowed this quantity of hydrate of chloral in some syrup. Extraordinary efforts for restoration were made by remedies intended to give relief from the effects of opium, and which proved successful in this case. It was not known until afterward what the poison was, when she, after becoming conscious, told what she had taken. She was completely restored.

In the extreme stage of poisoning by this article the symptoms are very like those of poisoning by prussic acid: the subject is entirely prostrated and unconscious; there is great difficulty and interruption of the breathing, which is stertorous, with frothing at the mouth. Vomiting may have occurred, but now the subject is past that, and presents every evidence of the dying state. Convulsions and delirium may occur, or the body may be thrown

into a state of opisthotonos, and then go into death by a universal relaxation, in which all the sphincters are opened and the passages are let off.

Signs after Death: The cases of examinations after death have not been numerous, but they present the usual signs of the narcotic poisons—not of those that affect the mucous membranes, but rather of those that spend their power on the brain and nerves, simply.

Analysis: When heated, hydrate of chloral will melt and entirely volatilize without combustion, unless the flame is brought into contact. So it may not be called an inflammable substance. It will pass over in a liquid form in distillation, but after a time it disposes itself into groups of crystals. It is soluble in hot water, which fluid retains it on cooling; but when heated alcohol has become saturated by it, it will give it out again, in part, on cooling. The solution is not acid, and has no bleaching power. It dissolves in the stronger acids, and, in sulphuric and nitric, without change of color.

In the Dead Body: Potash, added to a fluid containing parts of the body possessing the hydrate in fluid or semi-fluid state, will give off chloroform, that escapes freely with effervescence. The chloroform thus escaping may even be condensed and collected.

SPINAL POISONS.

CHAPTER XIII.

It is very noticeable that some of the neurotic poisons that have been formerly classed together are yet of very different power in their action on the system; or, rather, they evince special symptoms that prove them to act on the *spinal system of nerves* more especially. Of these *nux vomica* and its alkaloid, strychnine, may be given as examples.

NUX VOMICA—STRYCHNIA.

No poisonous drug is more likely to be selected for criminal purposes than strychnine. This is so because of the certainty of its effects, and the smallness of the dose required to kill. *Nux vomica* is only less used because it is not quite so easily disguised, as its dose requires to be very much larger—the poisonous properties of the *nux* being dependent almost entirely upon the strychnine it possesses, and this amounts to only about one-half to one per cent. of the whole. A fatal dose of strychnine may be as small as one-half a grain. The quantity of *nux* necessary is about the amount of the powder of one button or seed, or about one dram.

One reason that these poisons are selected is because the criminal can time his operations with something of precision. *Nux vomica* will act usually in about one hour after its administration, and strychnine in about one-quarter of an hour. Still, while the time is not certain, another particular is pretty much so, which is

the fact that until it does take effect the person taking it will experience no noticeable impression, and will thus proceed with the usual habit; this admits of the criminal making safe his retreat.

It is somewhat remarkable that persons who are acquainted with the nature of the action of strychnine or nux vomica should ever select these substances for purposes of suicide, since scarcely another article in the entire list of poisons is so severe and terrible in the distress produced before death comes to the victim's relief.

Symptoms: In some twenty minutes after taking a fatal portion of nux vomica or strychnine, the person experiences a feeling of uneasiness and restlessness, attended with a sense of suffocation that is very oppressive. There is then a shuddering and trembling of the whole body, with twitching of the limbs. The characteristic tetanic symptoms then set in, and violent convulsions occur. The limbs are thrust violently without control of the will; the fists are clenched, and, after violent contortions of the spine, there is a persistent opisthotonos (bow-like stiffness backward) that almost brings the head and heels together. The violence of the contractions of the muscles of the body and limbs is liable to fracture and dislocate the bones and draw the body out of natural shape. The abdomen is tense and chest fixed so as to resist respiration, and the face becomes purple or black. The jaws are not, however, always permanently set, and even in severe cases or advanced stage the sufferer may sometimes open the mouth and swallow. The mind is clear, except as disturbed by the anguish. This clearness of the mind shows that strychnine is not a cerebral but a spinal poison.

The convulsive or spasmodic movements are intermittent to a greater or less extent, according to the force of the poison. These intermissions may be from half a min-

ute to several minutes, even in severe cases. During these intervals the person may speak and express his desires, but the slightest movement may suddenly bring on the spasms, and a series of convulsive throes will follow.

During the spasms the pulse is quick—sometimes so quick as not to be counted—but moderates during the relaxation. The eyes are staring and pupils contracted during the paroxysm, but dilatation and a great sense of prostration marks the intervals.

There is usually great thirst, but not generally any nausea or vomiting. Restlessness is continuous, and the sufferer entertains a constant apprehension of death. This event, or a somewhat speedy recovery, happily terminates the sufferings and extreme anguish in a very short time; nature seems incapable of enduring such tortures for any considerable time. The symptoms from this poisoning are distinguished from simple tetanus and trismus by the less permanency of its spasms.

Appearances after Death: Usually the spasms relax in death, and the body becomes flaccid. Then it stiffens afterward, as in other cases of bodies after death. The blood is dark or blackish purple; the stomach and bowels natural, with the veins in the coats congested; the lungs congested; the spinal marrow, especially in the upper part, greatly congested, and large quantities of blood in a fluid state have, in some instances, been found extravasated in the vertebral channel. The medulla oblongata and membranes of the brain are injected; the heart is contracted and empty, except that sometimes the right cavities may contain some liquid blood. The signs that may be looked for mainly are those that would result from mechanical pressure caused by the violent contraction of the muscles and consequent pressure upon the vessels and viscera.

Chemical Tests: The powder of nux vomica may be distinguished from other vegetable powders of its appear-

ance by its flame when burned on platinum, which has a yellow smoke; but this is only a corroborative test. Nitric acid turns it orange red, which color is obliterated by chloride of tin. But the best test of the powder is by the use of the microscope, which reveals the peculiar silky fibers of the *nux vomica*.

Strychnine is a white crystalline substance, its crystals being of various shapes, and is intensely bitter. This bitterness may be perceived when present in only the one-thirty-thousandth part in a solution. When heated on platinum it melts and burns like resin, with black smoke, and in a close tube its combustion yields ammonia. It is scarcely soluble in cold water, requiring 7,000 parts of water. It is easily dissolved by acids, and is precipitated from these solutions by potash, in which it is insoluble. Owing to the presence of *brucia* in it, strong nitric acid imparts to it a pale reddish color. Sulphuric acid affects its color little, but a series of nice changes of color ensue on adding to the mixture of strychnine and sulphuric acid some bichromate of potash or ferrocyanide of potassium. The color is green with the first, and blue or purple with the latter. Black oxide of manganese turns it red by yielding its oxygen.

Boiling the contents of the stomach with acidulated water, filtering and concentrating by evaporation, and then precipitating the strychnia by potash (or without concentration, when much is present), will afford the tests from reactions by means of sulphuric acid and bichromate of potash or the ferrocyanide of potassium, added after the acid upon the dried precipitate.

When the test is made with the tissues, as muscle or membranes, these are to be cut up and heated in water containing acetic acid and alcohol in small quantities. This will extract the strychnia. The process of extract-

ing is to be repeated by pressing the substance to divest it of the liquid, and adding to the latter fresh portions until a reasonable strength is obtained, when the fluid holding the strychnia is separated by straining through linen. This fluid is then to be concentrated by a water bath, and the strychnine precipitated with potash. When the precipitation is not successful, the liquid is still not to be abandoned, but it may now be shaken well with a compound of ether and chloroform—two parts of the former and one of the latter. But, to make this process entirely successful, the solvent—that is, the ethereal mixture—must be in excess; two parts to one of the juice acted upon is a proper proportion. The ethereal compound separates the strychnia from the watery mass, and the withdrawal of the ethereal portion by means of a pipette will thus bring the process to a state when the strychnia may be isolated. There will likely be fatty matter and other organic substances present. The proceeding now will require the spontaneous evaporation of the ethereal part, which will leave a resin-like remainder. This is to be placed in a flask, and a small quantity of strong sulphuric acid added, which will destroy the animal matter; water added now will enable the operator to filter through paper. From this the strychnia may now be precipitated with potash, which neutralizes the acid and lets the strychnine precipitate. The test of the strychnine, if not detected by the microscope to be crystalline, may still, whether in crystals or not, be recognized by adding a few drops of strong sulphuric acid, and then some peroxide of manganese, which gives the strychnine test in the color reactions.

Medical Jurisprudence has much to do with strychnine, since this drug is so commonly employed for criminal purposes, and because, also, expert testimony is ever im-

portant in such cases. Hence, the physician and the jurist should be well informed in regard to the properties (toxicological and chemical) of this potent agent.

One particular is important in this case, as with opium and morphine, that the failure to find it by testing the contents of the stomach, blood or tissues will still not be a reliable proof that poisoning by strychnine or nux vomica may not have taken place. No physician can, therefore, state that his failure to detect it is a positive proof of the case; for strychnine, like morphine, as implied above, may disappear in the body after poisoning to death any animal. The presumption, nevertheless, obtains that if the poisoning was done by strychnine, this substance is very likely to be found by proper testing and a well-conducted analysis.

BRUCIA: This is an alkaloid like strychnia, that is found in the seed of the nux vomica; the two alkaloids are together, but may be separated. It appears that brucia is also found in the bark of the tree bearing the nut, and exists there in greater proportion than as found in the nut.

The properties of brucia are, toxicologically, about the same as those of strychnia, but less powerful in proportion as one to six.

It is not likely ever to become a subject of forensic investigation, and needs no discussion here.

STRYCHNOS IGNATH: This is the *St. Ignatius bean*, and is ranked among the spinal poisons. Its symptoms are very like those that attend poisoning by nux vomica.

STRYCHNOS TIEUTÉ: This is the *upas plant* of Java, so famous in history, being the poison into which arrows and other weapons were dipped to cause certain death in

cases of wounding, if even in the slightest degree. It is a very violent poison, but not more so than the strychnine of *nux vomica*, which it resembles in the symptoms it produces.

UPAS ANTIAR: This is the *upas tree* of Java, also famous in history, as the next above; but this had its notoriety for its fabled *death vapor*. It was said no one could approach the vicinity of this tree and live, and that its proximity could always be known by the bones of its victims strewn about it. But, while the fables as to the poisonous vapor proceeding from it are now disbelieved, it is yet certain that the *substance* of the tree is poisonous and deadly, although less so than the *tieuté* plant. The French chemists have tested it for strychnine, but have not found it present, although its symptoms are like those of the *nux vomica*, being equally speedy and certain in its effects.

WOORARA: This is the South American arrow poison, which the Indians of Guiana still use on their weapons. The tree from which this poison is taken is supposed to be a *strychnos* (the *S. toxifera*). Woorara is certainly a very virulent poison, which fact has been well attested. It is a spinal poison, or *tetanic*.

NOTE: Neither of the four last named poisons have come into the courts, and Medical Jurisprudence does not require that they should now be treated as to their special tests and analysis—at least, it is quite sufficient at the *present* time that the physician and jurist inform themselves in regard to the symptoms or toxicological effects, and then judge by a comparison of these. The symptoms of poisoning by all these are very much like those that characterize poisoning with *nux vomica* or

strychnine. When such symptoms, therefore, do appear, the investigation is very properly conducted with the view of discovering, not these, but strychnine. This suggestion obtains for a dozen reasons. The chief one is, that these strange poisons are not obtained in this country without difficulty, because they are not commonly kept in the stores. Another chief reason is, that these poisons could not well be procured any way without exciting suspicion, since it is so seldom (if ever) that any of them are called for in an ordinary way, while strychnine and nux vomica are frequently procured now from stores for many purposes. As medicines, they are employed by thousands of physicians. As a means of imparting certain properties appreciated in spirituous beverages, strychnine is popularly held to be a constituent seldom lacking; and, as a poison for dogs, cats, foxes, wolves and noxious vermin generally, nux vomica is the most popular agent.

From these various considerations it is obvious enough that when a poison, followed by symptoms indicating nux vomica or strychnine, is in question, then these latter are the proper drugs to be searched for, and, for purposes of jurisprudence, no attention need be given to the others.

CEREBRO-CARDIAC POISONS — SEDATIVES.

CHAPTER XIV.

THERE are a number of medical and other drugs that have usually been called narcotics indiscriminately, but which, on more careful study, have been found to produce such impressions on the brain and nervous system as to affect the circulation very prominently, and have also inherited the name *sedative*; but yet, if the term *sedative* be considered according to its proper etymological meaning, it still does not meet the requirements. *Sedative* means *quieting* or *soothing*, and so does not conform to the idea of a *poison* proper. The term *cerebro-cardiac poison* has been proposed, and has gained favor. It implies a poison that impresses the heart, or heart and arteries, through the nervous system, and so affects the circulation prominently in their characteristic impressions. The terms *poisonous sedatives* and *deadly sedatives* have often been employed by persons treating of this variety of neurotic poisons, and these terms have one significance that is worthy of consideration, since they imply that there may be sedatives which are *not* poisons. Such are lobelia, gelseminum, macrotrys, etc. These have decided sedative properties, but are not poisonous. They exert a soothing or quieting power over the nerves, arresting irritation and so letting down the excessive action of the heart and arteries, which exacerbation is occasioned by the irritation.

That the principal irritability in the tissues may be impressed without being destroyed, is a rational idea. cer-

tainly. Astringent, relaxant and tonic powers are not destructive or poisonous, and yet have *cumulative* force in their impressions on the tissues. Since, therefore, we do not call simple tonics astringent or relaxant poisons, *sedatives* may be entitled to the same exemption, though they may be cumulative in power, also. *Cumulation* of power is the circumstance that often occasions mischief in very innocent agents, but the term poison is out of place in such cases. The restraining power that relieves the action of the heart and arteries when suffering from excessive irritation is sedative, but not necessarily poisonous. Lobelia, gelseminum and macrotrys are not poisons, but are valuable relaxant and anti-spasmodic agents, as evinced by their remarkable effects in spasmodic diseases, such as tetanus, cramps, convulsions, asthma, and even hydrophobia and mania, or, as exemplified in their wonderful action in cases of fever and inflammation, by the relief of the vessels and the consequent perspiration superinduced.

Nevertheless, there are sedatives that are not *simply* such, and these may be deadly sedatives and destroy life. Such are aconite, veratrum, belladonna, digitalis, etc. These agents require to be considered as to their toxicological properties. They are also occasionally employed for criminal purposes, and so demand a place in the list of poisons.

ACONITE.

This is a drug that is much in use as a medicine, and its purchase is seldom suspected as intended for mischievous purposes, and hence is liable to be in requisition as a poison for criminal intent.

Symptoms: Soon after it is taken in a poisonous dose—say in from a few minutes to an hour—very decided symptoms set in. The first sensation may be a tingling

impression in the mouth and throat, which soon extends to the limbs, and is thence characterized by a letting down of the power to stand or walk. Paralysis is a characteristic symptom. The property producing the paralytic effect impresses itself upon the mouth and tongue, first as a cooling, then benumbing, sensation, which never ceases until alarming paralysis and deathly signs appear.

It is not the tetanic property, as in strychnine, that characterizes this poison, and hence there are commonly no convulsions in poisoning by aconite. It is more like that of a narcotic, such as opium, but yet not clearly so; still, there is dilatation of the pupils, dimness of sight or blindness, but not coma or deep stupor.

The impression upon the heart, which is its great and distinguishing characteristic, notable by the depression of the pulse, not only in regard to its force, but its frequency also, and then the sinking of the physical forces—in a word, the letting down of the powers of life—are the symptoms that the medical witness and the jurist have occasion to take note of as proof of poisoning by aconite.

Chemical Characteristics: The poisonous property in aconite is a peculiar principle, denominated *aconitina*, which is a most wonderful substance as to its power as a poison. If the investigations now accredited are to be relied upon, it may then be said that aconitina is certainly more powerful and deadly than strychnine or any other of the vegetable alkaloids. Dr. Pereira gives an account of its action in a dose of one-fiftieth of a grain upon a lady that well nigh destroyed her life ("Materia Medica," Vol. 2, part 2, p. 695). But it must be remarked that there is some difference in the aconitina of the stores as to its strength, and such a dose as is referred to by Dr. Pereira is commonly not noticeable as toxicological.

The chemical characteristics of aconitina are not very satisfactorily defined, but the following may be noticeable: (1) When heated in a close glass tube it evolves, first an alkaline and then an acid vapor; (2) in open air, when heated, it readily fuses, and then burns in a bright yellow flame; (3) it is scarcely soluble in water, but goes into solution with weak acids and alcohol; (4) nitric acid dissolves it, without change of color; (5) sulphuric acid gives it a yellowish color; (6) bichromate of potash gives a green product (oxide of chromium?); (7) ammonia does not precipitate it from its solution in any crystalline form; (8) tannic acid, chloride of potassium and mercury will readily throw down a precipitation from a clear solution.

In the lack of a sufficiently reliable chemical test, the following method may be found of the best avail to afford testimony: Digest the suspected portions in ether by repeating the exposure of the materials in fresh lots to the same ether, and when thus supposed to possess the aconitina, which is soluble in ether, then press out and test the ethereal solution as to its toxicological power on animals. This is the best method, but a solution in alcohol is recommended by Dr. Headland for the physiological or toxicological test. Thus the dried product of a tincture of a stomach, taken from a body killed by aconite, produced the following effects: *First*, large animals were made to show signs of poisoning by $\frac{1}{30}$ of a grain. *Second*, $\frac{1}{100}$ grain poisoned a bird; $\frac{1}{300}$ grain poisoned a mouse; $\frac{1}{1000}$ grain gave the effect of a tingling sensation on the human tongue.

BELLADONNA.

Symptoms: Heat and dryness of the mouth and throat; nausea and vomiting; giddiness and blindness, or double vision; stupor and delirium; dilatation of pupils, and

insensibility of the iris to light; difficult deglutition; diminished pulse; prostration of strength; inarticulate speech; paralysis; death.

A large proportion of cases present symptoms proving not a depressing effect, but rather an exalted one, on the nerves for some time, and then the depression, when the irritability and sensibility of the system have become exhausted. Thus, there is in such cases an intoxication, as from alcoholic spirits, or protoxide of nitrogen: the subject is exhilarated—laughs, talks and frolics in glee. The still more excited symptoms in the first stage resemble those of delirium tremens, and of this the fanciful varieties, in which hobgoblins, “snakes in the boots” and all sorts of fancies appear; but this stage is not of long duration, and the depression that follows is generally decided.

Death follows a fatal dose in from one to three hours; but circumstances may delay the dissolution longer.

Post-mortem: Stomach and bowels pale and flaccid, with sometimes red or purplish spots toward the cardiac portion, and sometimes a dried or shriveled appearance of the mucous coat; heart and lungs often of a livid color, from congestion of tissues; brain and membranes greatly congested and sometimes extravasated, always with dark blood.

Analysis and Detection: The poisonous property of belladonna is dependent upon a peculiar principle contained in the plant, called *atropia*, and this is to be sought for.

As to the substance of the drug that is susceptible of detection, our attention is to be directed to the use of the microscope. This may lead to the discovery of particles of the leaves or seeds of berries. But, for criminal purposes, the drug would not be given in the crude state, but rather in the form of a tincture or extract, and, therefore, the atropine is to be sought for.

The following are some of the facts that concern the chemical and physical properties of atropine, which are to be borne in mind when a course is adopted for analytical investigation: (1) Atropine is not very soluble in water; (2) it is easily dissolved in alcohol, ether and dilute acids; (3) the atropine melts at 194° and volatilizes at 284° , and the alkaloid is at this point and higher heat decomposed. The precipitate thrown down from a solution of sulphate of atropia in sulphuric acid by ammonia is not crystalline, and in this respect it differs from morphine, strychnine and various other alkaloids. Heated on glass, atropia first melts and darkens in color, then burns with a yellowish, smoky flame. When pure, sulphuric, nitric and muriatic acids dissolve it without change of color. It is not decomposed by iodic acid. Sulpho-molybdic acid effects no change upon it immediately, but after a time the mixture acquires a blue color. Mixed with sulphuric acid, it will produce a green color by the addition of bichromate of potash (oxide of chromium?). Tannic acid precipitates atropia from its solutions.

The best precipitant for atropia is a combination of chloride of potassium and mercury, which takes it down freely. It may be precipitated by chloride of gold, but this is a costly test, and, as the mercury and chloride of potassium make by all odds the best precipitant, this combination is to be employed in precipitating atropia from its solutions taken from the materials of the stomach or intestines of the poisoned body, or from solutions made from other parts thereof.

Perhaps the most decided test for atropia is a solution of bromine in hydrobromic acid, this reagent producing, even in a highly attenuated solution of atropia, a precipitate which, though amorphous at first, will yet soon resolve itself into yellow crystals.

But, after all, there are no absolutely certain chemical tests for atropia as existing in foul materials of the body, so, therefore, the toxicological and physiological tests must be tried for corroborative proofs.

The solutions obtained from viscera or contents found in them, or those prepared from the mesenteric glands, may be tried on rabbits, cats or other suitable animals, and, observing the effects on these, additional or corroborative proof may thus be afforded to the chemical tests.

TOBACCO.

It must not be considered strange that tobacco—an article in such great use in common life and in all ranks of society—should be placed in the list of poisons that are proposed for investigation in such connection as is now in hand; for tobacco is not only a poison, but it is a *deadly* poison. It is only the circumstances and conditions, ever obtaining with those who seem to use tobacco in common habit with impunity, that obscure the most positive facts as to the virulency of this poison. When the habit of its use is formed, nature, which is the conservative power naturally inherent to all animals, is, by this training or imposed control, so impressed and incited to *provisional expediencies*, so to speak, that it will make a *new law*—one that is, as it were, a compromise, thence to be conformed to forever. Thus the very consent of nature to the use of tobacco as a life habit is, on her part, actually a detail of force in the economy having this poison as its objective forever. Very few there are who do not hold memory of their experiences of discomfort during the time that the tobacco habit was formed, which period was the same, also, when nature was projecting her most consummate expediencies. How very sick they were!—how revolting to feelings!—how severe the struggle, sometimes,

before the habit could be tolerated! All this sickness and discomfort was really the penalty that nature imposed; and afterward, when a truce had lasted for a time and a treaty was made, the seeming complacency of nature in urging obedience to the terms of the treaty (which urging is experienced by the longings of appetite for the tobacco) by no means shows that the tobacco habit is judicial, even though it be now seemingly constitutional, because the detailed force that the tobacco habit occupies constantly is really so much loss to the modicum of the physiological forces. Few persons can realize the absolute facts in the premises by their natural sense and feelings, and, therefore, the case can only be precipitated into the category of presumptive axioms or inductive speculation. But there are none of the curious and interesting questions that come into the domain of physiology, and which characterize the phenomena of organic life, that are more positively the subject of fixed principles than those very same in the premises.

A negative truth is hard to prove, and so, if the subjects of the confirmed tobacco habit do now and then succumb to some casual disorder, we can not come into an improvised court with specifications in a bill of charges, and the case passes in default.

But, coming now to the practical form of the matter, when tobacco is to be considered and treated of as a cerebro-cardiac poison, we have a definite formula, as in all the other instances, and the facts are to come out in their definite character.

Tobacco has its record in the courts as a poison employed for criminal purposes. In the trial for murder in the case of Count Bocarme, in Belgium ("Ann. d'Hyg.," 1851, Vol. 2, pp. 147 and 167), is one in point. But the records given of the extreme virulency of tobacco as a poison are very numerous, and the limits of this work

will by no means admit of a tithe of the testimony afforded of its character.

Symptoms: As given in Taylor's "Medical Jurisprudence" (American edition, 1880), they are: "Faintness, nausea, vomiting, giddiness, delirium, loss of power in the limbs, general relaxation of the muscular system, trembling, complete prostration of strength, coldness of the surface, with cold, clammy perspiration, convulsive movements, paralysis and death. In some cases there is purging, with violent pain in the abdomen; in others there is rather a sense of sinking or depression in the region of the heart, passing into syncope, or creating a feeling of impending dissolution. With the above mentioned symptoms there is dilatation of the pupils, with insensibility to light, with confusion of ideas, a small, weak and scarcely perceptible pulse, difficulty of breathing and involuntary discharge of urine."

Dr. Beck, in his "Medical Jurisprudence" (Philadelphia, 1838, Vol. 2, p. 628), gives the following: "It is not necessary to multiply cases proving the poisonous nature of this substance [tobacco] when taken internally. The death of Santenil, a French poet, was caused by an inconsiderate person emptying the contents of a snuff-box into his wine, which, as soon as he had swallowed, excited vomiting and incessant pain, and he died in fourteen hours. So, also, when the infusion or the smoke is administered in large quantities—as by a clyster—convulsions, sickness and vomiting supervene, and death often is the result.

"A female in London was persuaded by an empiric to use the infusion as a cure for worms. Soon after its exhibition as an enema she was seized with violent convulsions, and died in fifteen minutes. Another in Ham-burgh took an enema consisting of an ounce of tobacco boiled in water for fifteen minutes. In two minutes

thereafter she was seized with vomiting, violent convulsions and stertorous breathing. Death ensued in three hours after taking it. * * * In a case where the expressed juice of tobacco was applied to the head of a boy for tinea capitis [scald-head], it proved fatal in three hours. The brain and viscera were found healthy, but the blood in the heart was fluid, with the exception of a coagulum in the right ventricle. In the case related by Dr. Grahl there was, two days after death, great lividity of the back, paleness of the lips and flexibility of the joints; the omentum very red, without gorging of its vessels; the small and great intestines, both outside and inside, gorged and red, and in some parts the mucous membrane extravasated; bloody patches."

Effects on Animals: Tobacco is very poisonous on animals of every variety. Dr. Brodie, the celebrated experimenter, tested its effects on many animals, and found it very poisonous to all. The infusion injected into the rectum of an animal produced faintness and early insensibility and death. It stopped the circulating power of the heart, and caused syncope. The oil of tobacco, in his tests, occasioned violent convulsions, frequent respiration and death, occasioning this termination by destroying the functions of the brain. Death usually ensues, when fatal doses have been administered, in the course of one to three hours.

Signs after Death: Considerable has already been stated in regard to what is to be seen of the effects of tobacco on the body as shown by dissection; and it is now only necessary to state that the effects, as proven by such investigations, are principally upon the nervous system, and particularly on the brain, by which the functions of the heart are arrested. The decarbonization of the blood is thus arrested, and death ensues with the usual signs of asphyxia.

Analysis: Chemical investigation has proven that the poisonous properties of tobacco reside in a peculiar principle now well known under the name of *nicotina*. This substance, when separated or pure, is discovered to be extremely fatal. It is declared by Dr. Taylor to be equal to prussic acid in its power and speediness of destroying life. The length of time elapsing after the use of a single drop of *nicotina* is only from one to three minutes.

It had been observed, before the discovery of *nicotina* in tobacco, that earthen pipes, long in use for smoking tobacco, were very poisonous; and this is the source (old pipes) of the poison, as recorded in various medical journals, when used for destroying life. Accidental cases of poisoning are also recorded as having resulted from the poison of old tobacco pipes. The same author, last above cited, reports the case of a child, three years old, that died from the effects of poison from an old wooden tobacco pipe used by the child in the amusement of making soap bubbles. The child was in the best of health the moment before this use of the pipe, but thereupon it very suddenly died with the symptoms of narcotic poisoning.

Chemical Tests: The chemical tests for tobacco are not sufficiently well defined as yet to afford reliable evidence of its identity, and the evidence, therefore, of its presence must be sought by a comparison of the history of the symptoms with those noted as characteristic of tobacco; and this is to be corroborated by the physiological or toxicological tests afforded by administration of the products of solutions obtained from the contents of the stomach, or from other viscera or tissues of the suspected body, to animals such as cats, dogs, rabbits, etc.

DIGITALIS.

Symptoms and Characteristics: The *fox-glove*, as known by the English name, is to be placed among the cerebro-cardiac poisons, as its symptoms prove it should be. It is different in several respects, however, from the few last named, especially in being less narcotic. Its effects are evidently more topical than those of aconite and belladonna; and this topical character is displayed in the stomach and bowels.

Dissections of the bodies of persons who have died from poisoning by digitalis have shown that the viscera of the abdomen have been most affected. The stomach has presented the signs of inflammation on its mucous membrane, and this is the case, also, as regards the intestines. Vomiting and purging are both characteristic symptoms.

Still the great depression of the action of the heart and arteries is regarded as the main characteristic symptom of digitalis. This, beyond doubt, has its primary cause and condition precedent in the effect it displays on the brain. Dissections prove the brain to be very greatly congested in this poisoning. Lethargy and comatose symptoms appear. The pulse is always greatly depressed, and this symptom is attended with marked prostration. Among the symptoms, also, are dilatation of the pupils and insensibility to light.

Analysis: The analysis of digitalis has discovered the existence of a peculiar principle denominated digitaline, which possesses all the poisonous properties of the drug. It constitutes about one per cent. of the leaves of the plant. This substance has, however, not been produced in a crystalline form, and its chemical properties are not fully known. Still it is discovered to have the properties

of the plant in a very highly concentrated form: one-sixteenth of a grain has been known to give signs of poisoning; doses of from one-eleventh to one thirty-second part of a grain have depressed the pulse sensibly, and also caused nausea, vomiting, griping, purging and increased urinary passage.

A fatal dose of digitaline is placed at from one-quarter to one-half of a grain.

Digitaline has gained a record in the courts. The case of the trial of Dr. De la Pommaris, of Paris, for murdering a woman named Pauw ("Orfila on Poisons," third edition, p. 801), was a case in point. The drug appears, however, when used in the crude state, to be inferior as to the speediness of its action to either of the foregoing in this order of poisons.

VERATRUM: Hellebore is the plant from which the medical drug veratrum is obtained. There are three varieties—the white, black and green hellebore.

But this is not an agent that is selected for its poisonous powers. Dr. Taylor states that he never knew a case in which veratrum was used for the purpose of poisoning. This is a little remarkable concerning this drug, because it certainly is one of very considerable power. Dr. Callaway reports a case in which a woman was brought to the verge of the grave by one-fiftieth part of a grain of veratria, which is an alkaloid principle found in the white hellebore.

STRAMONIUM: The *datura stramonium*, or thorn-apple, would have its place here if it were a criminally used drug. But such is not the case, and it is unnecessary to treat of it otherwise than to state that the drug has considerable power. Stramonium appears more in its

action like the more simple narcotics than others named among the cerebro-cardiac poisons. Its effects are well recognized in the eyes, by their dilatation and insensibility to light.

CONIUM: There have occurred a few indictments for murder in which conium, or poison hemlock, was used. It is a poison of sufficient potency to destroy life with certainty. The power of the poison, like that of all these vegetable narcotics, is found in a *peculiar alkaloid principle*. In this plant this principle is called *conicine*, or *conine*. Like nicotina, it is of a volatile character, and is easily dissipated. A grain or two of conicine will kill a man in an hour. The extract requires a dram for a fatal effect.

NOTE: In all cases where the chemical tests are obscure, it is really a course necessary to be pursued, for the furnishing of the best evidence, that the proceeding shall comprise the physiological and toxicological effects of the products of the solutions from the visceral contents and those from the tissues or other portions of the dead body. If the symptoms produced by the action of these products on other animals correspond with those that the history of the case in hand has afforded, then the one point is gained, which is, that the poison, whatever it may be, that killed the individual whose body is being inspected, and which produced the corresponding symptoms on the animals to which the products were administered, *must be identical*. Then it is only left for the expert to compare these symptoms which have furnished this satisfactory tally with those that are the known characteristics of special poisons that may be suspected in any given case. Such comparisons of symptoms afford good grounds for testimony. The observance of this pro-

ceeding can not be too strongly urged in all obscure cases; and both the medical and law student should bear this in mind as a landmark in Medical Jurisprudence, or legal evidence.

Toxicology, as a science, is thus a very important study for forensic purposes.

PREGNANCY.

EXPERT testimony is frequently required in courts in cases of trials of various character, civil and criminal. There are, indeed, few questions that occur in forensic medicine that require more good sense and competency of a witness than the questions that concern pregnancy. On the proper decisions relative to these matters depend the honor, property and sometimes the life of the female.

LAWS OF NATIONS CONCERNING PREGNANCY.

The Roman law exempted a condemned female from punishment, if found to be pregnant, until after her delivery.

The English common law has specific provisions concerning pregnancy as it relates to inheritance. There are two cases in illustration of the importance of points in this law that may be cited here, and which will show what diligence should be bestowed by the professions of medicine and law for the acquisition of thorough information:

“Sir Francis Willoughby died, seized of a large inheritance. He left five daughters (one of whom was married to Percival Willoughby), but not any son. His widow,

at the time of his death, stated that she was with child by him. This declaration was evidently one of great moment to the daughters, since, if a son should be born, all the five sisters would thereby lose the inheritance descended to them. Percival Willoughby [son-in-law] prayed for a writ *de ventre inspiciendo* to have the widow examined, and the sheriff of London was accordingly directed to have her searched by twelve women, etc. Having complied with this order, he returned that she was twenty weeks gone with child, and that within twenty weeks *fuit paritura*. Whereupon another writ issued out of the Common Pleas, commanding the sheriff safely to keep her in such an house, and that the door should be well guarded; and that every day he should cause her to be viewed by some of the women named in the writ, and when she should be delivered that some of them should be with her to view her birth, whether it be male or female, to the intent there should not be any falsity. And upon this writ the sheriff returned that accordingly he had caused her to be kept, etc., and that such a day she was delivered of a daughter."

Thus the law directs that "the heir presumptive may have a writ *de ventre inspiciendo* to examine if she be with child or not, and, if she be, to keep her under proper restraint until delivered; but if the widow be, upon due examination, found not pregnant, the presumptive heir shall be admitted to the inheritance, though liable to lose it again on the birth of a child within forty weeks from the death of the husband."

The other case is also one of a civil character, but the result proved the service of this law in its other alternative. It is that of Mr. Fox, of Uttoxeter, who died at the age of sixty, leaving a young widow of recent marriage (six weeks), and the widow, also professing to be *enceinte*, was examined by the order of court under a writ *de ventre*, and, though she opposed the examination, had in this case to submit, and was examined by Dr. Fox, who pronounced her pregnant. The vice-chancellor of the court ordered the vigilance of two surgeons and two matrons, by fortnightly visitations of the widow, until birth. She was delivered of a son, and he succeeded to the inheritance.

But the more interesting feature of English forensic law is in the Criminal Code. This seems to be founded on the old Roman law. A pertinent point will also be here cited, together with the comments of Dr. Paris, the highest medical authority, perhaps, in England at that time. This point elucidates the technical element of the law. When a female is capitally convicted and pleads her pregnancy, though this does not set aside the judgment, it stays the execution till after birth. The requirement of a professional examination also exists, but here this latter requires more skill than the civil cases. The law demands a discrimination whether the woman be "*quick with child*," for a report "*with child*" will not give the respite; and the evidence of "*quickening*" is required. It is upon this feature of the law that Dr. Paris makes his judicious criticism. He declares that "here the law

of the land is at variance with what we conceive the law of nature, and it is at variance with itself; for it is a strange anomaly that by the law of real property an infant in *ventre sa mere* may take an estate from the moment of its conception, and yet be hanged four months after for the crime of its mother." But Dr. Kennedy puts it in a more exact tenor with the terms and spirit of the law in what soon follows, and points to its inconsistency with still greater sarcasm. He says: "The maxim of British law is, that a child in the *fifteenth* week of its foetal existence is to be deprived of life for its mother's crime, whilst a child in the *sixteenth* is to be protected from such an unjust and unmerited fate."

In Scotland the law on this point is different. There a pregnant female is entitled to have sentence delayed; or, if it has passed, she is respited on proof of pregnancy, whether she has or has not passed the period of *quickenig*.

It appears that a law existed in England to protect pregnant females as early as Edward III, and that this related not only to the death penalty, but also to the matter of imprisonment. At least, it is evident that at a later period the law contained provisions that reached cases of imprisonment, as is proven in the case of Elizabeth Slymbridge, whom Chief-Justice Coke released from imprisonment on bail because of this plea, and which had been verified by examination.

In France there is also a provision in the Codex to meet such cases. Foderé and Capuron conducted researches

to clear up the French laws on both criminal and civil enactments relative to maternal relations, and have furnished, also, additional facts that are of such interest as to merit notice here.

The Civil Code, section 185, declares that no female shall be allowed to contract marriage under the age of full fifteen years. But yet such marriage shall not be annulled, when, *first*, six months have elapsed after the female, or both of the parties, have attained the marriageable period; and, *second*, when the female, although not of the required age, *has become pregnant* before the expiration of six months.

The Penal Code, section 27, declares that if a female condemned to die states that she is pregnant, and if she is proved to be so, she shall not suffer punishment until after her delivery. This law has existed and has been in force in France from the year 1670.

In the State of New York there has been a recent enactment that reads thus: "If a female convict sentenced to the punishment of death be pregnant, the sheriff shall summon a jury of six physicians, and shall give notice to the district attorney, who shall have power to subpoena witnesses. If on such investigation it shall appear that the female is quick with child, the sheriff shall suspend the execution and transmit the inquisition to the governor. Whenever the governor is satisfied that she is no longer quick with child, he shall issue his warrant for execution, or commute it for imprisonment for life in the state prison." (Revised Statutes, Vol. II, p. 658).

In the United States, generally, the common law is followed in reference to the *enceinte* female criminal or prisoner. Thus the medical-witness, as also the lawyer, has the facts as to the professional duties that may require attention.

SIGNS OF PREGNANCY.

CHAPTER XV.

Suppression of the Menses: The first sign of pregnancy may be regarded the suspension of the menses, which secretion has very properly been regarded as having a vicarious relation to gestation. Thus then, when conception takes place and new functions of the uterus come into exercise, which are not co-ordinate, but rather the complement the one to the other, in alternate relations, the one will cease when the other proceeds.

It has hence, from the regularity of the disappearance of the menses from the time of conception, become the most notable sign of pregnancy. But, though this is a rule, it has its exceptions, since cases occur of the continuance of menstruation during the first part, and, more rarely, all the time.

Then, again, this rule will be found to lack service in such cases where conception may occur in females that have never menstruated, for, although extremely rare, there are such cases on record.

What is a more frequent failure of the service of this rule is what happens not unfrequently—the occurrence of pregnancy where menstruation is irregular and uncertain. Various diseases, and also feebleness of constitution, may occasion a failure of regularity of menstruation, and which may yet admit of conception taking place.

The menstrual fluid is distinguished from blood by its paleness and by its not coagulating, and, by the microscope, in the absence of blood corpuscles.

Prominence of Abdomen: The enlargement of the abdomen is a sign of pregnancy that is popularly noted, and, when gestation has progressed on toward half the usual period, it becomes a sign of service. But the person taking evidence can not rely on this sign alone, especially not from the outward appearance, when the clothing and lacing may cause changes of appearance. Again, there may be other causes than pregnancy that enlarge the belly, such as dropsy, enlargement of an ovary, or even obstructed menstruation.

Modified Sensations: Among the incidental signs of pregnancy are those that are experienced by the female herself, and when she reports her feelings they may afford at least corroborative evidence. There is, from the time of conception throughout the whole period of gestation, more or less change of feelings. At first there are to be noted morning sickness, nausea, attended with a disposition to spit saliva. Sometimes there is faintness and a trembling sensation; at other times heart-burn (so called) and pain in the back. In advanced stages there is constipation of the bowels.

Change of the Breasts: Pregnancy will cause the breasts to enlarge on persons that do not ordinarily have full breasts; but what is more sure is the change of the color of the *areola*, or ring of color around the nipples. This darkens from its natural pinkish hue.

Quickening: From the fourth to the fifth month (generally about the fourth) there is a very notable change of the uterine state. At this period the woman begins to experience the sensation of independent life; she feels a sense of movement in the womb that is not caused by herself in any way. The child in the womb, from now on, is capable of mechanical movements of its own; its limbs, body or head can be felt to move. These motions, in more advanced periods of pregnancy, are often so considerable as to occasion distress to the woman.

At this period of quickening the womb rises up and out of the pelvis, and thereafter rests in the abdomen, on the basin of the pelvis.

Auscultation: A stethoscope, properly used, or even the ear applied over the gravid uterus, will enable the examiner to discover the sounds of the foetal heart. The means of discrimination is that these sounds are not synchronous with the pulsations of the mother; the heart of the foetus beats quicker.

Vaginal Tests: By the process called *touching* we may determine evidence of pregnancy. The mouth of the womb changes as pregnancy progresses; the neck of the womb is obliterated progressively, and the convexity of the closed mouth is lessened, so that it feels more flattened. The womb, as it appears before pregnancy, is smaller and more yielding to pressure. The direction also changes as pregnancy progresses—the mouth inclines more toward the spine.

Ballottement: This manipulation is regarded by many obstetricians as the surest test of all. It consists in the discovery of the foetus in the womb by the resistance it opposes to a sudden percussion or thrust of the finger when advanced through the vagina to the mouth of the womb, and then the motion made that the judgment suggests for ascertaining the presence of a body or foetus. It is by the upward thrust of the finger, or both forefingers rather, and then by careful observation of the effect of the thrust as to the weight that is lifted and the secondary impulse felt in the thrust as from the body within the womb. The foetus is supported within the womb by intervention of the amniotic liquor, and this being less resisting than the foetus, which is harder, the latter can be observed in its presence. Judgment must, of course, be put into requisition in this testing, and the examiner must be able to discriminate as to the differ-

ence there is in the two conditions—the one when the womb is in the small, unimpregnated state, and the other in the larger and occupied state, and then, taking the character of the resistance offered into account, the facts, all brought together, make the case.

FEIGNED PREGNANCY: Testimony is sometimes required in cases of suits brought for compelling marriage or for damages, and court orders of writs of *de ventre inspiciendo* may need to be obeyed; sometimes, also, out of court, in cases of persons applying for charity to a corporation or trustees of charitable institutions. In neither of these latter cases is it likely that a witness will be required to make a vaginal examination, or to specialize by tact in any way, for there is no compulsion, as in cases of the courts. Nevertheless, the physician may be consulted in such cases, and it will be expected that he is intelligent in such matters; if he is not, it will prove to his detriment.

UNCONSCIOUS CONCEPTION AND PREGNANCY: Questions sometimes come up as to the possibility of a woman becoming pregnant unconsciously, and the judgment of a physician may be required on this point. Referring to this question, then, as to the probable or possible facts, the answer is that such an occurrence is exceedingly improbable, but is yet *possible*. Conception is not, in a physiological sense, a voluntary act; the conditions afforded are one thing, and the conception another, so the will or the consciousness, physiologically, is not a factor in the premises. Let the conditions once exist, then the physiological act is involuntary and takes place unconsciously. Some females have declared that they were conscious of the act of conception; but, perhaps, such averments are not in place. They can carry no further

assurance than the moral question of *veracity*, since no descriptions of said sensations can afford a definition. The averment that it is easier or "*better felt than told*," is not one that is of competency in a court when it applies to a second party or concerns another person. The truth is, that conception itself is a physiological function, independent of the will.

Still, the question returns, can the act necessarily antecedent to conception take place without the knowledge of the female? This may be answered in the affirmative. Instances are on record where females have been drugged, intoxicated or otherwise made unconscious, and who have then been made victims of lust.

The question has also been put to physicians as to the possibility of a sleep being sufficiently sound to allow the unconscious occurrence of the act necessary for conception. Although, in the matter of sleep, like all other human affairs, there is hardly a limit to variety, we still could not say certainly what the *possibilities* are; but it may be safe to say that, in *natural* sleep, such an event could not occur unconsciously. There may be congestion of the brain by overheating, over-excitement, or from certain diseases, so that it may become so oppressed as to produce catalepsy or a deep somnolency, that might admit of almost any ordinary force upon the body without mental consciousness thereof.

DELIVERY.

CHAPTER XVI.

MUCH more frequently is testimony in court required in the matter of delivery than in that of pregnancy. Concealments of births may be made from various motives. Where crime or scandal is involved the cases are plain. With delivery the question as to whether living or dead fœtuses are brought forth greatly enhances the importance thereof.

This subject comes into consideration more readily under two forms: *first*, the signs of delivery in the living subject; *second*, those to be noted in the dead body.

Signs of Delivery (concealed) in the Living Subject: The particulars to be inquired into in this case are various, and the grounds for reliable proof require to be very carefully considered. The terms employed in disposing of facts require definition. Thus, if a delivery occurs before the sixth month, the event is called a miscarriage or abortion, in professional or common life; but the law makes no discrimination as to the question of crime when violence is used for the expulsion of either the ovum, fœtus or child—that is, if a delivery is produced by violence at any period between tangible conception and the full time of nine months, it is called abortion, and crime attaches to the procuring act.

The evidences of delivery are either clear or obscure, according to the time at which the event has taken place. In recent delivery the woman is weak, her countenance pale, and the eyes will show the strain that she has been

put to, by a livid circle about them. Still, as other severe illness may produce these signs, also, they alone can not be taken as satisfactory evidence; but when their appearance happens suddenly in a suspected case they are of importance. The breasts are enlarged, too, toward the third day by milk in them, and the nipples are more prominent.

The appearance of the skin over the abdomen may show the relaxation by wrinkles; or it may present, besides, a flabbiness, and the white streaks caused by former over-distension may be notable in the lower part. The uterus may also be felt, by pressure on the lower part of the abdomen, as a hard, round object, likely to be on either side.

The natal organs will be likely to show signs: they may be swollen or bear evidence of severity. Blood may perhaps be noticed about them. The labia will be liable to be distended, or show signs that they had been so. The vagina will be relaxed, and the mouth of the uterus somewhat opened, with margins soft or relaxed.

But the smell and presence of lochial discharge is a more sure sign. This sets in soon after delivery, and continues one or two weeks. Its characteristic odor is to be noted, for this is generally regarded as a very sure sign. These signs are only to be expected in recent delivery, say within several days to a week or two.

In delayed examinations these signs are still to be looked for, because, although they may not appear, their absence will prove questions of time somewhat, and have correlations with other proofs.

Signs of Delivery as Seen in the Dead Subject: In cases of suspected delivery, the event of death is generally supposed to be incident to the delivery, and, if so, the signs are expected to be found obvious. The proceeding may be by the opening of the abdomen over the region of the

uterus as a first thing after a notice for appearances about the natals.

If the pregnancy had gone to full time, then the appearance of the uterus will be unmistakable, if the case be a recent one. The uterus will be found large and flabby (nine to twelve inches long), with mouth dilated. On opening it, the place of the placental attachment will be readily discovered by the appearance of color or darkened aspect, and the vascularity at that point. The uterus, after delivery at full period, when it has contracted, may be expected to be about seven or eight inches long and half as broad. In one week it is likely to be five to six inches long, and in two weeks four to five inches. Its walls, at first contraction, may be an inch thick; but in these particulars there is some variation, for the uterus contracts more rapidly in some women than in others. As time proceeds, the thickening of the walls of the uterus lessens, but they grow in hardness or compactness.

Coagula of blood may also generally be expected to be found in the uterus or vagina in recent delivery.

In cases where the delivery occurred at periods before the full time of gestation, then the signs, as stated to be expected at maturity, will be less apparent, except as to the appearance of blood, which latter may be even more conspicuous than what is found in case of full time.

An abortion at early periods of pregnancy will require the examination of the ovaries, and Fallopian tubes, and round ligaments. The ovaries will be vascular and the corpus luteum well defined, having a cavity, and its surrounding parts more congested than elsewhere. The Fallopian tubes and round ligaments will be found congested.

The question whether it can be determined if a woman had ever conceived, by examination of the ovaries, may sometimes be of importance. This has now become

pretty well settled. When conception takes place one ovum of the cluster in the ovarium (on one or the other side) will break away and leave a cicatrix, the *corpus lutea*. This is of a yellowish appearance. The margin is swollen and the center with a cavity. In case of twins there are two *corpora lutea* found, but they are not in the same ovary; one will be on the right ovarium and the other on the left—hardly ever both on one.

The definition of terms may be of some importance in court testimony. These may be here specified:

First. The ovum is the first stage of development. This, when conception takes place, escapes from the ovarium cluster and is carried into the uterus by the corresponding Fallopian tube, where it takes on surroundings of membranes and becomes the embryo.

Second. The embryo is the more developed state of the new being, and is that stage preceding the third month of gestation, and which on further development becomes the fœtus.

Third. The fœtus is the stage of the child after the third month up to birth, when the term child more properly applies.

When the ovum is expelled before the end of the first month after conception, it will be detected with some difficulty, owing to its being enveloped in a coagulum, and, as bloody menstruation sometimes occurs, the discrimination needs care for definite conclusions. At first the ovum contains no visible embryo, but appears as a vascular point, with delicate membranous covering. When the fœtus first becomes discoverable, it appears as an oblong speck about a line or twelfth of an inch in length. In about six weeks the new being appears, curved in shape, and somewhat in the form of a split bean or grub, as it floats in the albumen. In the seventh week the

growth attains the size of a bee, or about three-fifths of an inch long. At the end of the second month it has acquired over an inch in length. At the end of the third month it will weigh from one to two ounces, and, when stretched out, will measure perhaps three inches, and its genitals are to be noticed, and to be large in proportion; still the sex is not yet defined. The body now, with its membranes and fluids, will appear about the size of a goose-egg. The growth after the third month is rapid, so that by the end of the fourth month the fœtus is five to six inches in length, and will weigh perhaps three ounces. When five months have passed the fœtus will have attained a length of from five to seven inches; and at six, from eight to ten inches. At the end of seven months the size will have attained a foot in length, and the weight from one to three pounds; and at the end of eight months it will probably be thirteen to fourteen inches long, and weigh about five or six pounds. At birth—on completion of the nine months—the child usually weighs from seven to nine pounds. But in all these periods there is considerable difference in the size and weight, just as there is a difference in the size and weight of adults. The skin of the new-born child is thick, and from the seventh month on it is covered by a whitish, unctuous matter.

CRIMINAL ABORTION.

CHAPTER XVII.

IN medical language the term abortion means the expulsion of the fœtus or contents of the womb before the sixth month of gestation; and the later occurrence of the event is called premature labor. But in law the distinction is not thus regarded, the term abortion being applied to the expulsion of the fœtus or contents of the womb at any period from the time of beginning up to any period before the end of pregnancy.

Criminal abortion is seldom attempted before the third or fourth month, because it is not till then that there is any certainty of pregnancy, and the woman will not be disposed to take the risk and suffer the distress, to say nothing of the exposure, until the urgency of the case brings her to it.

The greatest perplexity of a medical witness in giving expert testimony is the clear discrimination between an accidental abortion and a criminal one, because the physical signs that distinguish them must, in the very nature of the case, be more or less obscure.

It usually requires violence, either direct or indirect, to produce abortion; but yet there are some constitutions that are liable to admit of abortion when no appreciable violence is brought to bear in the case. Various estimates have been made of the proportion of abortions in which no known cause exists to that of natural births; and it would seem from these estimates that accidental abortions are more frequent in Europe than they are in America.

Whitehead took account of two thousand pregnancies, and reported that of these *one* in *seven* aborted. It is believed that no statistics of this country show anything like so great a proportion of abortions by accidental and constitutional causes.

Diseases are liable to produce abortions, especially such as are violent or cause a great shock upon the system. Small-pox and syphilis are prolific causes of abortion.

Among the mechanical causes of abortion are violence, as blows upon the abdomen, or such a concussion as will do violence to the uterus or body as may happen from a fall or a concussion by collision. Violent labor, as washing, or other severe physical exercise, as horseback riding, etc., are frequent causes.

Drugs administered, that are violent in action, or which may have a specific power on the uterine system, are also prolific causes; among such are ergot, savin, crocus, turpentine, etc. Violent purgatives also have a power in this way. Great mental excitements also have such effect, and many cases of such might be cited.

All these facts must be borne in mind by the physician and jurist; and, since the same physical causes may produce this effect, whether they be brought to bear intentionally or not, we find here a great difficulty to determine whether or not any guilt attaches.

In most cases the proof of the fact of abortion alone can be given by the expert, and the corroborating circumstances must determine the question of guilt. Nevertheless, there are some cases that are evidently occasioned by design, and such do generally show the nature of the violence used. But, to show what extremely difficult cases of this character come into court, a case or two of such in history may be in place here. The bearing of the cases goes to show how strong the moral questions that prejudice such cases may be sometimes, and how much professional skill may be put to fault.

The first case here given is one that occurred in France in 1770, and reported officially. Louisa Bunel, aged twenty-five, was seduced and became pregnant. Her menstruation ceased during a time she was laboring in harvest, and she attributed this event to the fatigue of her exertions. Feigning, or being ignorant of the cause of her increasing abdominal enlargement, she declared herself dropsical, and applied to several monks for medical aid, and took diuretics, but without effect. At the sixth month of her condition she married, but not to her seducer, and after that continued the use of such abortives as *savin*. At the end of three months after marriage she was delivered of a child while alone, and succeeded in avoiding exposure for a time. She had carried the child to a distant field and covered it with leaves, being wrapped in some linen, which assisted in after detection. Eight days after this event a dog discovered the body and brought away some fragments of the linen to the house of a neighbor. Judicial search was then made, and the woman was discovered to be the mother, and was condemned to death for the crime of infanticide. She had made three pleas in her defense: *First*, that she was perfectly ignorant of her pregnancy, and had taken remedies with a view of relief from dropsy. *Second*, that the child was born dead. *Third*, that at the time of delivery she was so extremely weak for four hours that she could not call for assistance, and, on reviving, resolved to cover her shame, seeing that, as the child was dead, this might so easily be done. An appeal of the case was carried to a superior court, where *sixteen medical experts of Paris* testified in the appeal, and the lower decision was reversed and the woman set at liberty. On the testimony of these experts the case turned on the following points: *First*, could the accused be ignorant of her pregnancy and conceal it with another complaint? *Secoud*, could she

innocently make use of remedies that she confessed she had taken? *Third*, is it certain that the child was born dead, and, if so, what occasioned its death? The experts sustained the affirmative of the first two on the ground of the uncertainty of the signs of pregnancy, and the readiness with which it may be confounded with diseases of similar symptoms. They also adduced in favor of their positions the authority of Astruc, Zacchias, Senac and Hebenstreit. This last authority points to a fact that a female might be impregnated when intoxicated, and might go the full time without knowing it, and then, on being seized with pain, might mistake it for colic or painful menstruation. Dr. Beck, in alluding to this case, quotes from a reviewer of the testimony in the "Edinburgh Medical and Surgical Journal" (which reviewer, doubtless, was Dr. Christison) as follows: "*Can a female be ignorant of her pregnancy till the child is brought forth?*" There are manifestly three conditions required before we can believe such a thing possible, viz.: that impregnation took place without her knowledge; that her pregnancy imitate some natural disease, and that her delivery be accomplished either suddenly or without her knowledge. As to the first, he concedes that it may take place if she be not a virgin, and in every circumstance, during the profound sleep induced by narcotics. It may also be deemed to be hydrometra, or dropsy of the uterus, and thus deceive, during the whole progress of pregnancy, not only the female, but the most accomplished accoucheurs. The last, we know, does sometimes occur. It is obvious that a person may be delivered without being previously aware of her pregnancy, but, since each of the three requisite conditions is exceedingly rare, we may justly pronounce it barely within the bounds of possibility, and only to be credited, in individual cases, when the female gives sufficient evidence that the conditions in question

did actually occur. Further, as the third condition can exist only in the case of those who have borne children, the plea of ignorance must necessarily be excluded from the greater number of trials, *which too generally concern those who have erred for the first time.*"

Another case is recorded where a female had conceived when in a state of stupor caused by the administration of opium. It is one of a virtuous young woman, who, during the horrors of the French revolution, was violated while the victim was entirely unconscious of the act, during the oblivion resulting from the use of the narcotic.

Dr. Gooch, in his "Midwifery," mentions a case of a most singular character, which goes to show that sleep may be so profound as to admit the possibility of the act necessary to pregnancy to take place unconsciously to the victim. As related by Dr. Gooch, it was in the case of a young maid at an inn, who was ever reputed virtuous and bore a good reputation every way, but yet showed signs of pregnancy. She, in most solemn protestations, declared her innocence, and averred that she never had connection with any man, but was at length delivered of a child, and, being brought before a magistrate to be sworn as to the paternity of the child, she still, under oath, averred her innocence of the act in question. Of course, no one believed her after the proof developed, but some time afterward a post-boy stated that, on coming to the inn one night, when all had retired but this girl, whom he discovered to be in a very sound sleep upon the hearth-rug, he thence proceeded to gratify his lust upon her person, and succeeded without awakening her.

INFANTICIDE.

CHAPTER XVIII.

HISTORY furnishes us with considerable information concerning the laws of nations on the subject of infanticide.

The states of ancient Greece were mostly very lax in this matter; indeed, some of the states enjoined it upon parents to destroy all their children that had blemishes or were weakly. All children were, by the laws, the property of the state, and parents were only custodians. The state had no prospective use for sickly children, and so they were destroyed. The Spartan law required that every child born should be examined by *ancient men* of the tribes, and such children as were found deformed or weakly should be thrown into the deep cavern at the foot of Mt. Taygetus, called *Apotheta*.

Thebes, however, had a higher moral sense, and incorporated the elements of humanity into her laws. One statute expressly forbade the exposure of children as done by other Grecian cities and states.

But of all the ancient nations, there were perhaps none that enacted laws so inhuman as Rome. Her laws gave to the father the liberty of destroying his offspring at discretion. But this was not all, for the laws recognized in the father the power over life even in adult age. (See Sallust, Cat. XXXIX, "*Fuere tamen extra conjunctionem*," etc.)

Not only were such sentiments characteristic of legislators in municipalities and states, but it entered into

the philosophy and literature of the times: Socrates, Plato and Pliny indorsed them. And those laws continued down to the age of Constantine.

Some ancient nations, as the Canaanites, Persians, Phenicians and Carthaginians, had human sacrifices as parts of their heathen worship. No doubt Abraham was accustomed to witness such sacrifices, or he would have thought it more strange that he should be called to make a sacrifice of his son Isaac.

The Egyptians seem to have had more humane laws, and yet their kings had the power over the lives of the children, as is evinced by the commands of Pharaoh to destroy the Hebrew children.

The ancient Germans, while they practiced the sacrifice of the prisoners they took in war, were not addicted to the crime of infanticide.

But the most atrocious laws concerning infanticide were enacted in India, China and the islands of the Pacific and Indian Oceans. Female children were not regarded as entitled to life, except at the discretion of the parents and the state. Females were regarded as of but little account, and not generally considered worth the trouble of raising. Marriage was not common, and fewer women sufficed. In the large cities of China, such as Pekin, the municipal arrangements provided for the use of carts to go along the streets in the morning and pick up the dead children thrown out during the night. These were carted off without the cities and buried in holes, or cast into open pits. It is related, also, that live children were thus deposited indiscriminately with the dead.

In Hindostan infanticide is a religious rite, and has been for many centuries, although this worst of heathen crimes is now, by the advance of civilization, mostly abolished. The doctrine of metempsychosis would not allow injury to beast, bird or reptile. But human beings

had no protection. In all countries where the doctrine of transmigration prevailed, there human life was lowly esteemed.

Civilization carried with it everywhere bodily salvation; and penal laws were enacted everywhere against infanticide.

Medical Jurisprudence has much concern with infanticide, for two reasons: the one because it is a very frequently occurring crime, and, secondly, the crime is such as may be somewhat easily covered, and because ocular testimony and circumstantial proof—that is, proof of matters of *fact*—are so often insufficient to convict the guilty. Hence, expert testimony is in absolute requisition.

Fœticide: Before proceeding, it may be proper to give some further attention to definitions. The term fœticide sometimes comes up in forensic medicine, and should be considered. But the term, while in use, has really no requirement. It implies nothing more than what is covered by the term abortion, as this latter term is now used in law. Professionally, where the delivery of the fœtus, occurring in last months of gestation, is called premature birth, and not commonly abortion, there the term fœticide is proper enough; but in law, where abortion covers all deliveries in advance of full time, there the term may as well go out of use. Fœticide means the killing of the fœtus in utero, and this takes place in abortion as viewed in law.

The question of violence, or evidences that the killing was done while in utero, is that which would be needed to be considered so as to distinguish, when possible, between a criminal cause and a simple casualty or abortion from constitutional causes. The case is a difficult one. The greatest clue we have may, perhaps, be in finding evidence of violence at vital parts. An intentional killing would be likely to indicate the use of violence in

some way on the vital parts, and here we may thus find evidence of purpose in the cause of the death. But, after all, the evidence thus obtained is not very satisfactory, and should never be alone relied on.

EXPERT PROOFS OF INFANTICIDE—*Proofs of Life before Respiration*: The difficulties in proofs of infanticide are occasioned by the question whether children found dead, without evident signs of criminal violence, may have been born dead, or whether death had taken place at a subsequent event. Respiration, in these cases, was formerly the test relied upon, but now it has been made clear that life in a born infant may exist in advance of respiration, and so infanticide may be perpetrated in advance of respiration. It is now evident enough that children born seemingly dead, and never having the lungs inflated, may yet be brought to or resuscitated afterward. Life has thus continued for an hour or two without inflation of the lungs. In this transition state of life from the uterine to the after state, there seems to be a kind of adaptation to the circumstances, and the processes of nature, or impulses impressed by the placenta, are of availment; or, what may be a still more satisfactory view of the matter, the constitution of the new-born infant does not at once require respiration imperatively.

Viability, or Uterine Age of Fetus: Before proceeding in the discussion of infanticide, something more than has been before stated of development in the uterus will be of use.

First, it may be proper to add that the sizes and weights at the different periods usually taken are a series that have resulted from French estimates. Those made by the Germans and Americans are usually larger and heavier. These latter estimates will be here given, beginning at the sixth month. At that period the calculations are all much alike:

1. At six months' gestation: Length, nine to ten inches; weight, one to two pounds; eyelids agglutinated; pupils closed by membranæ papillares; testicles not apparent.

2. At seven months: Length, from thirteen to fourteen inches; weight, from three to four pounds; eyelids not adherent; membranæ papillares disappearing; nails imperfectly developed; testicles not apparent.

3. At eight months: Length, from fourteen to sixteen inches; weight, from four to five pounds; membranæ papillares absent; nails perfectly developed and extending to ends of fingers; testicles in the inguinal canal.

4. At nine months: Length, from sixteen to twenty-one inches; weight, from five to ten pounds; membranæ papillares absent; head well covered with fine hair; testicles in the scrotum; skin pale; finger-nails well formed, and reaching to the ends of the fingers; features perfect and rounded; body regularly developed, even though the size and weight may lack fullness.

The particulars to be observed in the examination of the body are as follows:

1. *Measurement*: This is to be from vertex, or top of head, to sole of feet, in a direct line (not curving over convexity).

2. *Weight*: Weighing should be done.

3. *Observance*: Notice the presence or absence of any fetal peculiarities.

4. *Notice*: Any marks or specialties of formation by which to identify the body again are to be noticed.

5. *Marks*: Any marks of violence; shape of wounds; bruises; lacerations; marks of instruments, of weapons, or appearances of ecchymosis, are to be noted.

6. *Umbilical Cord*: Has it been cut, lacerated or torn asunder; is it tied; how it appears; how near to abdomen the division.

7. *Examination:* See whether, in the neck, groins or arm-pits, there be present or absent any vernix caseosa, for the presence thereof will prove that the child has not been cleaned by washing nor had attention.

8. *Signs of Decay:* See if evidence of putrefaction or of decay is apparent by loosening of the cuticle, change of color of skin or other parts, and whether there be special odor observable.

9. *Identity:* Be sure to receive a good impression of the child every way, so as to help in any necessity of identification. This, for the expert, relates only to the body; the clothing, wrappings and other such matters relate to the testimony of mere facts, and not professional.

Coming now to the proofs of the question of life before respiration—that is, to determine whether the child was born alive—it is quite important to notice all the particulars, because these are nice points, and frequently come up; and, what is more, these same points are those about which controversy is likely to arise, and where professional men may have an honest difference of judgment. If a child be dead-born, it may have marks of violence on it, and so, also, if live-born. Now, to determine if these marks of violence show that death resulted from them or not is, as stated, the *great question* in this case. If the absence of signs of respiration were reliable, instead of being only strong presumptive proof that the child was still-born, then the difficulties would be narrowed down.

It may, perhaps, be correct to set it down that there is not one in a hundred cases where death does not happen before birth when the lungs are compact.

In the suspended state of life, in such cases as never had breathing, there may be very slight signs of irritation, but yet the expert should look very carefully to

discover if there be injection, or signs of irritation, such as are present in inflammation. If these appear, they go for evidence that life was present when the injury was inflicted.

Ecchymosis does sometimes occur in bruises made soon after death, but generally not, so it is well to notice if this sign of life be present.

If a laceration be found, it is to be noted if the margins are retracted or not. Dead flesh closes up evenly when cut, while cuts when life be present are gaping, and have recurved margins. Extravasation may occur and clots of blood form when injury is done soon after death, but are not apt to take place, and hence, if present, then we have another presumptive proof.

Contractions of muscles show there was anguish, and it should be noted what state the muscles are in, even though there is but slight chance of help here.

One of the causes of death, or methods by which death is brought about in children born alive, but showing no lung inflation, is by having the hips and nates immersed in water in the act of birth, so that the child will be suffocated. Another method is by placing an obstruction to breathing over the mouth and nose of the child as it comes forth. In both these cases there will be no external signs of violence. But on opening the body there may yet be proof of murder discovered. In drowning thus there may be water found in both lungs and stomach, for the irritability of the parts about the glottis may not be sufficient to cause the closure of the passage into the lungs. The epiglottis may not close down, and water may run into the lungs. The running of water into the stomach is still more likely.

In case of asphyxia from obstruction over the air passages at birth, there is usually the sign, more or less, of congestion in the brain and in the contracted lung tissue.

INFANTICIDE AFTER RESPIRATION: By far the greater number of deaths from criminal causes, constituting infanticide, take place after the child has breathed. Breathing is the very first act of the child, at birth, which it puts forth; and this comes usually with a cry. Respiration is by far the best proof that the child has been born alive. Yet, as has been stated, it is no certain proof that the child may not have lived after birth without respiration. The physical changes in the body of a child, caused by respiration, take place in the lungs immediately, and in the heart and blood vessels more slowly. The lungs afford the main evidence, and so the expert ought to look at them at once; and, in cases of live birth without breathing, the proof must be sought elsewhere.

Examination of the Lungs: The front of the chest is to be laid open by making incisions on the lower edge of the clavicles, in the direction of the spine, to a distance of about half the length of the ribs; then downward to the edge of the cartilages—the ribs being carefully sawed or cut. The diaphragm should be separated from the cartilages without opening the abdomen, and the flap so loosened is turned upward over the face. The appearances then to be noted will be: *First*. If the child has *not* breathed, the thymus gland (as large as the heart) will be found occupying the upper and middle part of the chest: the heart, in the pericardium, is lower and a little to the left. The lungs will be found in the chest, and of so slight a character seeming as if absent. They never cover the heart, unless swollen by disease. The thymus gland may be of a livid or pale color, but it is of no significance as to the fact of breathing. *Second*, when the breathing has occurred the lungs will be distended so as to fill the chest and inclose the heart. They are of a pinkish or light-red color. But in the matter of the expansion of the lungs, it is to be borne in mind that there

is considerable difference in the extent. The breathing is not always fully established for a time, and so the lungs vary in extent of inflation. Yet, although this is so, it may, nevertheless, be regarded as a rule that the degree of development in the inflation is a sign of the time that the child had lived.

Physical Appearance of the Lungs—Color: The color of the lungs before respiration is darker; is of a purple or bluish red aspect, or, may be, of a deep violet. But as the color, although of a bluish and darker hue, is still considerably variable, no positive judgment can attach to it. And, as the color is affected by the atmosphere, it must be remembered that exposure lightens the appearance of the lungs. After respiration the lungs are of a light red color; or, if the breathing has been defective, then the lungs will have a mottled aspect—that is, the part inflated will be swollen and of a red color, and the uninflated sunken and dark.

Volume: While before breathing the lungs are so diminutive as to be scarcely noticeable, they are, in the other case, full and spongy, filling the cavity of the thorax closely, and meeting the mediastinum in front.

Consistency: The microscope of low power or the lens will be of service in this part of the observations. Before respiration the diminutive lungs are compact, like liver or spleen. When inflated they are spongy and elastic. Between the fingers the air in them can be appreciated as occasioning a crepitus sensation. But it must be observed that in these particulars there is variation, according to the degree of inflation developed.

Weight: Bearing in mind that the size and age of the child must be taken into account, there is yet a rule by which the matter of weight will serve as a test. Before respiration the weight of the lungs is only about two-thirds, or often little over one-half, of that after breathing.

The average weight of the infant lungs, cut close at the bronchial end, is about 650 grains, while after breathing it is upward of 900 grains. An approximative test is what is called the

Hydrostatic Test: This, when no extraneous circumstances interfere, is a ready test. The lungs of the infant that has not breathed will sink in water; those of the other case will float, on account of the air contained. The circumstances that interfere in the service of this test are the hepatization of the lungs by disease, which may make them sufficiently compact to sink in water, even when the child may have had some imperfect respiration. Here, also, we must bear in mind that a child may live for a time after birth, even for several hours, without breathing. So this test must be judged accordingly, as not really certain. The exceptions, however, are very rare.

On the other hand, there are contrary exceptions. The lungs do sometimes, although rarely, float when no breathing may have occurred. The process of putrefaction may have set in, and have produced gas that expanded the lungs, and so cause them to float in water.

Then, again, it must be recollected that such cases may be, and are likely to be, affected by artificial efforts to institute respiration, by means of forcing air into the lungs of the child. This point needs to be considered or investigated in all the tests of the lungs made to ascertain if the child be still-born, or whether it had lived after birth. Proofs of infanticide thus involve all these various questions.

The following are given by Taylor as the particulars to be considered in regard to the *hydrostatic test*—that is, the exceptions to be noted:

1. The hydrostatic test can show whether a child has or has not breathed; it does not enable us to determine whether a child has been born *living* or *dead*.

2. The lungs of children that have lived after birth may *sink* in water, owing to their not having received air, or their being in a diseased condition.

3. A child may live for some time when only a small portion of the lungs has been penetrated by air.

4. A child may survive birth, even for twenty-four hours, when no part of its lungs has been penetrated by air.

5. Hence the sinking of the lungs (whether whole or divided), in water, is not a proof that the child has been born dead; but it is presumptive.

6. The lungs of children which have not breathed, and have been born dead, may float on water from putrefaction.

7. The lungs, as situated in the chest, undergo putrefaction very slowly. If but slightly putrefied, the gases may be pressed out; and if much putrefied, the case must be (in so far as this special test is concerned) abandoned, other tests alone having to suffice.

Artificial Respiration: It is proper to extend the matter of artificial respiration somewhat more, so as to note points of discrimination from natural respiration. The point on which the evidence may be confounded is in the sameness of the appearances of the effects of artificial respiration with those in which natural breathing was only partially established. But here, as in every other point, we have this advantage, that in every case where the air penetrated the lungs in the living state, the air is persistently there: it can not be removed by pressure; whereas, when the air has been forced into the lung tissue by artificial means, when the child is dead the air can be forced out by pressure. And so portions of lung that may float before pressure will sink after pressure. By holding a portion of lung between the fingers under water and pressing thus, air bubbles will

escape from the water, if the inflation was made in dead lung, while none will escape when the respiration has been natural, because the air can not be forced out of lung tissue when it has received it by breathing in life.

Evidence from Signs about the Heart and Fetal Vessels: It is known that the establishment of respiration obliterates the communication between the auricles of the heart by the foramen ovale, and that the ducts there, after gradually contracting, are converted into fibrous cords. But while this one particular would be conclusive evidence, and quite the best of all, if there were no exceptions, it is yet true that there are exceptions to such an extent as to abate the value of the proof. The point to be noted as militating against the conclusiveness of this evidence is that this closure is not speedy from the time that respiration begins in all cases. Sometimes months, or even several years, elapse before the closure of these vessels is effected. But the proof is, nevertheless, good on one of two points: When the closure has occurred, or is in process of accomplishment, it is evident that the child has breathed, and has lived long enough to allow of the proceeding. On the other hand, the open condition of these vessels, though presumptive, is yet not a sure sign that breathing has not occurred.

Ductus Arteriosus: Another change from fetal life to the post-natal is that the ductus arteriosus, which, in the fetal state, carries the blood directly from the right ventricle of the heart into the aorta, becomes obliterated in so far as the union with the aorta is concerned. After breathing is begun, the blood necessarily goes from the right auricle directly to the lungs, forming the developed state of the pulmonary artery.

This change is much more notable than that of the foramen ovale, and should receive special attention. This is so because the change is more abrupt. Only a few sec-

onds of time is required after the breathing of the child before a noticeable contraction is made in the aortal end of this duct, and so rapid is the progress of the closing that, at the end of a few hours, the contraction amounts to one-half or more of its full size. Then, in a few days (generally not over eight or ten), the final obliteration is being accomplished. The exceptions to this rapidity are not common.

One thing about this closing of the ductus arteriosus is, that it has successively three forms of contraction, as evinced where it joins the aorta—first (that is, within a few seconds), the contraction is cylindrical; then, in an hour or two, it becomes flattened, and, again, in the course of a few hours or a day, it becomes cylindrical, and continues so to the time of its entire obliteration.

Ductus Venosus: A still more speedy change among the foetal vessels occurs in the vein that comes off from the umbilical vein, and opens with the hepatic vein into the vena cava ascendens. In the foetus, before respiration, the ductus venosus is always open. After respiration is established, it contracts and forms a strong ligament. Usually, this closing occurs before that of either the ductus arteriosus or the foramen ovale. But just as was stated in regard to the closing of those other vessels, so is it with this: it is proof positive on one side, but only presumptive on the other. If the ductus venosus is closed, the child has breathed; if not closed, it may still have lived after birth. But this exception is rare.

Umbilical Vessels: There are in the umbilical cord of the foetus two arteries and a vein. The two arteries are the deflection of the iliac arteries, that pass up, in the foetus, along the sides of the urinary bladder and go to the umbilicus, and thence in the cord to the placenta, when in the womb. At birth this cord is divided, and then speedily the portion attached to the child will lose

its vitality—will decay and fall off. Within the body the umbilical vessels are obliterated as such and become ligaments. This process is a speedy one, and usually more rapid than the change of the other peculiarly fetal vessels. What was said above of the proof afforded of the living of the child after birth, as shown by the condition respectively of the peculiar fetal vessels, applies very fully to the umbilical vessels. It is a positive proof on the one side, and only a presumptive one on the other.

As the exterior portion or stump of the umbilical cord is most readily examined, this never fails to receive attention by the examining jurist. Its stages may be named as follows: Within an hour after birth the cord is of livid color—is dead; within a half day it is contracted or shrunk; within one day it appears considerably contracted and withered, and within a few days drops off at the navel.

Cicatrizization of the Umbilicus: The time after birth may be approximately judged of by the healing of the umbilicus, which usually occurs about the tenth or twelfth day after birth.

Contents of Alimentary Canal: Something relative to the question of the child having been born alive may be judged by what may be found in the stomach and intestines. If any appearances of milk or food is found in these passages, the high presumption is that the child had lived, because it is exceedingly improbable that these substances would be found in these passages if the child had not lived to receive them.

The jurist or expert witness, who has given diligent attention to the particulars here given, can usually give intelligent evidence in cases of trials for infanticide; and little more need be here stated, except as to the question of the chances that suspected cases may have resulted from natural or accidental causes. It is also important

to have a knowledge, as nearly correct as possible, as to the proportion of the number of natural deaths, or such as have taken place from accidents in which no legal responsibility attaches.

Causes of Death in Infants that are Natural or Accidental:

It is a matter ever to be borne in mind that death among new-born children is a very frequent occurrence from natural causes, and as the result of events where no responsibility is usually considered as existing. Hence, it is a credit due to general humanity to avoid the entertainment of suspicion, unless there be causes present to lead to such suspicion. The persistency of the life forces of the infant is comparatively less than that of advanced years, and a large proportion of children die from natural causes, often little understood. Again, the birth throes are so severe, even in the average character of parturient labor, that they prove fatal to comparatively many. Nor is this all, for it would be claiming too much if it were stated that the practice of obstetrics is perfect, and never allows of casualties. The celebrated Dr. Hunter pertinently remarks on this point: "We frequently see children born who, from circumstances in their constitution or in the nature of labor, are barely alive, and, after breathing a minute or two, or an hour or two, die in spite of all our attention;" adding, as a plea against hypercritical suspicion, and in justice to females having, when alone, a dead child with them: "and why may not this misfortune happen to a woman who is brought to bed by herself?"

Among the natural causes of death of infants at birth, Dr. Taylor enumerates the following as prominent: *First, a protracted delivery:* thus the long continued violence of uterine contractions, the interrupted circulation through the umbilical cord before breathing is established, etc., are extremely severe upon the tender infant.

Second, debility: a child is subject to causes of debility that are incident to the mother; it may be born prematurely, and so be weak, or there may be debility from disease of the fetus. *Third, bleeding,* from laceration of the umbilical cord or other violence. *Fourth, compression of the navel string:* this member of the fetal system may, during parturition, be compressed between the child and pelvis, especially in births by breech presentation. *Fifth, malformation or monstrosity:* not all females are perfect in their pelvic structures, and the child may have to pay the penalty of the *lapsus naturæ*. *Sixth, spasm of the larynx of the child.* *Seventh, allectacis* (collapse of lungs): though not common, yet occurring. *Eighth, congenital disease.*

INFANTICIDE BY VIOLENCE.

CHAPTER XIX.

AFTER the foregoing treatment of the subject of infanticide in general, it is now proper to take into consideration the various modes of the perpetration of the crime :

1. SUFFOCATION: This is a very common mode of causing death of infants at birth. A wet cloth placed over the mouth, or thrust therein, is a means so convenient, and which may be so easily kept from discovery, that it has become one of the most general methods resorted to. If done before the child has begun to breathe, it is difficult to detect the crime from ordinary still-birth. The term suffocation applies more properly to the causing of death by exclusion of air from the lungs after the respiration has been established. But it is convenient to treat together all these modes; and the act being more successfully kept from discovery if done before the child has breathed, this time is usually selected. And the heinousness of the crime seems also less apparent if perpetrated thus. A mother can let her offspring be cut off at this juncture, when in the agony so tragic-like as is parturition, more willingly than when the child has taken on the life characteristics more completely. When the child has breathed, given voice, seen the light, been cleaned, and, more especially, when once brought to her maternal breasts, there will have become awakened those natural instincts that will make cruelty to her offspring appear much more revolting than before.

Besides the method of closing the mouth and nostrils, as just stated, another way is also frequently adopted: It is to immediately at birth thrust the child under the compact clothing of the bed, which may also be accomplished with small risk of detection. The principle of this proceeding is the same, and the effect alike also. The lungs of the child will retain their collapsed or unexpanded condition, if the proceeding is accomplished before the air is permitted to enter the chest. The criminal usually places the hand over the mouth and nostrils immediately when the head is ushered forth, at the same time compressing the umbilical cord, which will produce death somewhat speedily. When thence the placenta is brought forth and placed with the dead child, the deception is somewhat easily accomplished, in pronouncing the case one of "*still-birth*." If breathing has been suffered to take place, then the difficulty of covering the crime is greatly enhanced.

The endeavor to keep the occasion of child-birth in seclusion, being so natural and common in practice, precludes suspicion.

Detection: Attention should first be directed to the detection of the signs of violence impressed upon the face of the child. Sometimes bruises or ecchymosis are discovered. The cuticle may be abraded, and the lips and nostrils discolored. Ashes, feathers, chaff, tow, rags, etc., are sometimes employed for the purpose of suffocation. These, by care, may be discovered. But the evidence thus adduced is not expert, but involves simply questions of *fact*.

Noxious vapors, as from sulphur, chloroform, ether, gas from burners, are used, and are always difficult to be detected. Sometimes the smell may be discovered on the child, and this should receive attention.

In such cases as these, where matters of fact are the chief elements of testimony, the medical expert is of service only to state whether such and such causes were sufficient to produce death. The contrary bearing of evidence is alike non-professional—that is, the bearing of exculpation—as these are simply matters of fact. But there are numerous cases on record where the suspicions were illy grounded; and cases have occurred which, on mistaken opinions in such premises, have led to convictions of innocent parties. It is a very common circumstance that a child is accidentally suffocated.

When the placenta is intercepted from the uterus, breathing is an absolute necessity during birth; and the navel string may be (which is by no means uncommon) looped about the neck of the child so as to strangle it during delivery. The cessation of expulsive pains in delivery, and neglect of the accoucheur, may result in suffocation. No professional skill suffices in such cases to discriminate causes, to a reliable extent. The expert may, indeed, by examination of the lungs, brain and other parts, determine that suffocation was the cause of death. But then the manner thereof comes into the province of *facts*.

The incidents of death by accidental suffocation, as they come under the observation of physicians and others, and as recorded by authorities, are very numerous. The late French physician, Dr. Jardien, reported 132 cases subjected to him for examination, and in this number over one-half—seventy-two cases—were suffocations.

The specialties concerning appearances and evidences of suffocation are treated of elsewhere, and need not receive any further attention here.

2. DROWNING: Infanticide is also very readily perpetrated by drowning. And here again the expert is put at fault, for he can not discriminate the case when the

child has never breathed. Even when this function has had precedence, it is yet impossible for expert testimony to determine questions of fact that obtain in the premises.

The method of proceeding, with criminal intent, is usually, when drowning is purposed, to either let the birth take place in an immersion of the hips of the female in a sitz-bath, tub, or other vessel, and the child ushered forth into the water is thus prevented from breathing by the presence of the water in the appliance, or the child is itself thrust into water and drowned.

It is not necessary that the whole body be immersed for drowning; and the placing of the face in a bowl or basin of water is more frequently practiced.

In the case of drowning the suspicions of observers have better ground than in cases of smothering by the methods that were alluded to under the caption of "*Suffocation*," for an exposure to water is no real necessity. The water used in washing the new-born infant can not be regarded as involving any exposure. Nothing but criminal carelessness could make danger exist in such an instance.

Hence, suspicion of criminal intent will more naturally arise if drowning occurs; and the plea of accidental drowning comes with an ill grace. Nevertheless, accidental drowning of infants has occurred, and even at birth. Dr. Taylor records a case of a woman who, in an advanced stage of pregnancy, having occasion to use a chamber vessel, was taken suddenly with labor pains and was delivered of her child while resting on the vessel. The child fell into the water and urine in the vessel and was drowned, without the power of relief from the mother, while none other was present.

It is proper again to state, therefore, that the expert can not be supposed to be able to discriminate as to causes, or the precise forms of means of death of infants;

the evidence is of the *fact* class. See more of causes of death in first part of the work, under head of "Drowning."

3. *Cold and Exposure*: The tender new-born infant can be subjected to death easily by the rigor of cold, or of exposure to a draft of air; and such a cause of death would be likely to preclude detection as to criminal intention. Yet the records of infanticide comprise cases of death by such means. It, however, is not required here to enter upon details of methods; and as to means of detection, the expert has no advantage. This case involves testimony of *fact*, also, most prominently.

4. *Starvation*: More negative than other methods of infanticide, and equally difficult of discovery, makes this a method by no means uncommon with those of criminal intent in the premises.

5. *Forced Delivery*: The subject of abortion comprised the methods and means of immature birth, and no necessity arises here in the case in this regard; but as to the frequency of its occurrence with criminal intent, it may be set down as one not rare. The traces for discovery of motive for the incident are equally obscure to those related in the last few modes treated of. The expert will be at fault here, as in those other instances. Who can say that the intent was criminal unless the physical signs appear? And then the case takes on largely the character of one of simple *fact*. Yet the expert may be of service to determine if given circumstances or causes could have been sufficient to *cause* death. Evidence of *fact* may be made to precede, and then the expert be called upon for judgment of sufficiency of cause of death in any given facts produced in the *fact* testimony.

6. *Wounds*: No more frequent means of infanticide exists than that of direct physical violence. Criminal motive is impulsive; and brutality is close akin with

such motive. Time for parley is not allowed; nicety of method is not thought of; the humane instincts are absent, and violence ensues. The neck of the child may be twisted; a blow upon the neck from behind with the edge of the hand; a strangling, by a grip of the fingers; contusion of the skull; impingement of a needle, scissors or other slender implement into the skull; compression of the chest or abdomen, or even lacerations of the flesh involving arteries, have all been comprised among the violent means of infanticide.

All these bring in evidence of *fact* rather than professional testimony. Yet in these instances, also, as in the former, expert testimony is available for the purpose of determining whether given injuries were sufficient to cause death.

In affording evidence of this character in these instances, it is alike important to bear in mind that innocent parties may be implicated. There are many instances where violence comes accidentally. This happens frequently from unskillful use of instruments in delivery. A child may also be accidentally dropped upon a hard floor and receive fatal injury. Accidental blows or thrusts occasionally happen. And because of such facts one in testifying must have his mind well possessed to do justice, or keep from doing wrong. Infanticide is a capital crime, and testimony relevant thereto should be carefully given.

7. *Umbilical Bleeding*: A woman intent upon destroying her offspring will sometimes lacerate the umbilical cord, or cut it without tying, and so let the child bleed to death. It is easy to say that it was an accidental occurrence; that the bleeding was not discovered until too late for help. Evidence of *fact* is the principal testimony in cases of this kind. But a physician may be called upon, nevertheless, to give judgment on points of professional character that may come up.

8. *Violence in Self-delivery:* It is possible that a parturient female may, in the act of delivery, exert herself sufficiently to cause the death of her child by her efforts. It is true that the expulsive force of the uterus, and to some extent that of the abdominal muscles, are involuntary in child-birth, yet the voluntary forces are also available, and a woman can inflict injury if she be resolved with such intent. A child may be cramped in its passage and subjected to violence by muscular contraction at will. And it is amazing to what extent the power of the will may overcome the paralyzing effect of pain and exhaustion, even as it is experienced in parturition. A child may be overlain and killed in such manner, amidst the after struggles of birth, as in the pretended efforts to expel the after-birth.

All these cases require good judgment and much deliberation, if full justice be secured all around.

R A P E.

CHAPTER XX.

R A P E, as recognized and defined in law, is forcible cohabitation; but a more specific and extended signification has in late years been given to the act implied. As thus defined it is: "The act of having carnal knowledge of a woman without her conscious permission, or with her conscious permission, if such permission is either extorted by force or fear of bodily harm, or obtained by personating her husband, or by falsely pretending that the act is necessary, or will be advantageous to her, for any medical or surgical purpose."

Rape is a crime in the eyes of the law of an aggravating character, and, although in most cases requiring testimony, the evidence is in matters of *fact* only, and the services of a physician are not required. Yet there are cases that require expert testimony, and the physician and the lawyer, also, have cause for having a good acquaintance with the bearing of the laws and the character of testimony that is pertinent and competent in such cases, and of the courts having jurisdiction. Most courts have such jurisdiction in this country.

The occasions requiring professional testimony are mostly in matters regarding the physiological functions of the sexes. Most other points comprise the range of *facts* only, in which expert testimony is not needed.

It is seldom the case that a suit taking in the nature of the subject in hand here is instituted where there is not a very considerable controversy and public notoriety,

because the crime alleged is not only of personal pertinency, but is an offense, also, against society and public morals; hence it is seldom the case that actions take place in which there is not a very considerable contest made. It is observable, however, that a very large proportion of cases that may open, even with much flurry and excitement, are not finally sustained in court. The late Professor Amos, of England, estimates the proportion of sure-founded cases in the circuit courts to those that have no cause of action, or which are dismissed, as only *one in twelve*. Perhaps this may be too small for this country; and this would then suggest that we are either less litigious or more loose in society, which it is not desired to say.

There are a variety of nice points in the laws concerning rape that the jurist should study well, and, on the other hand, there are also many very special physiological facts that the medical witness needs to be well posted in; and it seldom happens, when a suit is sustained, that these points and facts are not called out.

These particulars are so varied, and have such specific pertinency, that it is well to treat of this subject under divided heads, that may comprise matters of age of the subject outraged, the character of the special evidence required, and the competency of the evidence.

RAPE ON INFANTS AND CHILDREN.

In the cases of all persons subjected to rape under the age of twelve years in England, and ten years in most states in this country, the terms of the law differ as to the definition of rape. Under these ages, respectively, attempted cohabitation is rape, irrespective of the consent of the injured party. In law, the child is not recognized to be competent to protect her virtue, and her consent

affords no ground for a defense against the charge of rape. As there is a preciseness in the laws on this subject, and especially so in several states, while all maintain the court decisions made on the points, even where no special statutory provisions exist, it is well to give here a copy of some sections of the Revised Criminal Code of Pennsylvania (March, 1860, §§ 91, 92, 93):

“§ 91. If any person shall have unlawful carnal knowledge of a woman, forcibly and against her will, or who, being of the age of fourteen years and upward, shall unlawfully and carnally know and abuse any woman or child under the age of ten years, with or without her consent, such person shall be adjudged guilty of felonious rape, and, on conviction, be sentenced to pay a fine not exceeding \$1,000, and to undergo an imprisonment, by separate or solitary confinement at labor, not exceeding fifteen years.

§ 92. It shall not be necessary, in any case of rape, sodomy or carnal abuse of a female child under the age of ten years, to prove the actual emission of seed in order to constitute a carnal knowledge, but the carnal knowledge shall be complete upon proof of penetration only.

§ 93. If any person shall be guilty of committing an assault and battery upon a female, with intent forcibly, and against her will, to have unlawful carnal knowledge of such female, every such person shall be guilty of a misdemeanor, and, on conviction, be sentenced to pay a fine not to exceed \$1,000, and to undergo an imprisonment, by separate or solitary confinement at labor, not exceeding five years.”

The point where the testimony requires to be special, when small children are the subjects of injury, is what, in such case, is the extent of the proceeding that constitutes rape? It is certain that the full accomplishment of the proceeding can not occur in the case of very small

children or infants, such as the astonishing court records show to have been the subjects—even as young as seven months of age! as recorded in the Bristol Assizes, 1873, in *Reg. vs. Harris*.

The term *penetration* involves this question, and it is now abundantly evident, by the decisions in England and America, that a constructive sense is put upon the word, and that the ordinary sense is not taken of it. Penetration means only such contact as will spread the *labia majora*, or external parts. This constitutes "*penetration*." There need be no evidence of material injury, such as the rupture of the hymen or laceration of the labia. It is sufficient when there is a sign that violence was offered to the parts, such as an abrasion, leaving a discoloration, ecchymosis or inflammation; or if there be laceration. Thus the vagina need not be entered, but the spreading of the external parts only is sufficient, for this is what the courts decide necessary to make the case. The record above stands not alone in such meaning. The decision of Lord Meadowbank in the case of *Macrea* (High Court of Justice, 1841), in Scotland, meets this case. The judge stated, in this case, that evidence of emission is not essential, nor of entrance *through*, or even *to*, the hymen.

In the United States this point is sustained in the same way: "*Some degree of penetration must be proven, but neither rupture of hymen nor emission need be established.*"—Reece. The language of Dr. Taylor ("Medical Jurisprudence," 1880, p. 744) is: "There must be medical evidence to show that in a special case there was actual penetration—the degree of penetration being quite immaterial. It is true that there could not be a complete introduction of the adult male organ into the vagina of a child without a rupture or laceration of the soft parts; but the absence of such marks of violence would not justify a medical witness in denying the perpetration of the crime,

since the law does not require proof either of a complete or of a violent introduction. It has been decided that penetration to the vulva alone is sufficient to constitute this crime. Medical men have sometimes fallen into an error on this point, considering that when the hymen was entire rape could not have been committed; but the statute law says nothing about the rupture of the hymen as a necessary part of the medical evidence; it merely requires from the medical witness proof of vulval penetration. This may occur and the hymen remain intact."

However different medical opinions, privately expressed, may be as to the question whether it be possible for an adult man to commit the crime of rape upon a little child, it is now established by the courts that it can be done.

Examination: In taking facts for testimony by the medical expert, he proceeds to discover whether there are marks of violence on the subject of the alleged outrage. He can go only by these; no other source of testimony will do for an expert, no matter what is said about it. If there are no physical evidences, he can only *say* so. His testimony, therefore, proves nothing. He may say there might have been a perpetration, if there has been time for the signs to disappear, for he does not need to have proof of ruptures or lacerations, but he can not state that it did occur.

The signs to be looked for are evidences of bruising—which, in a recent case, will appear in ecchymosis or discoloring of the parts—of abrasion or laceration. There may be appearance of blood, in stains or in clots, or of aropy mucus or muco-purulent discharge, in case the injury was severe. The child will complain of injury and painfulness of the parts; there will, perhaps, be swelling of the parts and inflammation of greater or less extent, and of an earlier or later stage of development. The urine is voided with difficulty, perhaps, or there may be more or

less difficulty in walking, and painfulness in any effort to examine the vagina or hymen. Stains of blood on the garments are not reliable, as they may have proceeded from another cause; but these may be taken as corroborative. If the child be old enough to admit of entrance into the vagina, by the perpetrator, that may be found sore, injected, lacerated, relaxed or swollen, as the case may be, and there will then certainly be a discharge of mucus, more or less purulent. In such case the evidence is never obscure, if the case be recent.

It is well to take notice whether there is any evidence of digital manipulations, and the marks of the fingers may be left on the parts in smaller points than would otherwise appear. The microscope may be of use for the detection of stains of semen or blood.

It is, perhaps, proper to again give a note of caution to the medical examiner, that he must not be deceived or influenced by anything that is said to him about the case by the friends. Even the statement of the child herself is of no value to the expert, as that is hearsay, and, at best, is only matter of *fact*, of which facts he has, perhaps, nothing to testify about.

The signs above enumerated are such only as may be caused by the less violent abuses. There are others very much more noticeable—almost all degrees of laceration, bruising and separation of parts. The perineum may be torn to a greater or less extent, and the labia, clitoris and labia minora all in a state of laceration and consequent inflammation. Ulceration, mortification and death occasionally ensue.

A case is reported by an English physician (Dr. Colles) in which a rape was perpetrated by an adult on a child eight years old, which terminated fatally in six days after the assault. The child stated that the attack was very painful, and there was great loss of blood. On examina-

tion, it was found that, externally, there were no marks of violence, except that the perineum was torn nearly through. Internally, the injury was very great; the orifice, as also the whole extent of the vagina, was in a state of gangrene, and its posterior wall was lacerated at its junction with the uterus to the extent of an inch. ("Medical Times and Gazette," June, 1860.)

Another case, reported by a Dr. McKinlay to the "Glasgow Medical Journal," July, 1859, proves how extensive the injury may be when the subjects are very young. In this case the child was six years old. Her statement of the character of the assault proves it to have been almost tragical and terrible. It appears that she fainted from pain and bleeding, and the brute, nevertheless, proceeded. The vagina was torn in various directions; one laceration extended backward, and divided the septum, recto-vaginal and the perineum to the verge of the anus; at one place the vagina was torn through to the rectum; at the upper end the vagina was ruptured, also. Great swelling and inflammation ensued, yet the child recovered, after two months' terrible suffering.

In young children marks of violence are not usually found other than those about the genitals, because, in such cases, there can be no resistance offered by the victim.

RAPE ON GIRLS AT THE AGE OF PUBERTY.

At this more advanced age the signs that appear may still be somewhat like those found in cases of little children. There may be ruptures of the orifice, and even of the vagina, for the resisting struggles may have been such that the injury resulting is thus augmented. In other cases, the brutality of the proceeding alone may have been such as to occasion extensive lacerations. When the assaults are committed by boys, the physical injuries are

usually less. And yet it is sometimes the case that boys of tender age are vigorous in such assaults. A case recorded in the Liverpool Assizes of 1862 is proof of this fact. The author of this work was present in the city at the time, and had opportunity to know of the great surprise it occasioned.

The boy was seventeen, and perpetrated rape on *three girls within half an hour's time!* One of these was eleven years old, and the other two about eight years old each. The history of this case, as proven (for the criminal was convicted), was almost incredible, as it seems that no one could proceed thus rapidly in three cases, though in the third instance he did not succeed, but only made the criminal onslaught on the eldest one. The girls were together at the time, and he alone with them.

The motives for prosecutions for rape are various, not always being for redress of real injury, so the medical expert should be careful in all particulars that he be not deceived. Where impositions are practiced, there will ever be a reluctance to thorough examination. Usually, in cases of imposition in the trick requiring signs of the act of violence, there is effort made to occasion abrasion and physical signs of injury. But these will usually be superficial, and very seldom of much extent. There will be in such cases no signs of a struggle—that is, no other parts of the body than the genitals will be likely to show bruises. In real cases, the wrists sometimes bear marks of violence from rough handling, also the lower limbs, while in the cases of attempted imposition these proofs are usually wanting. Of course, these are only circumstantial or corroborating proofs.

Defloration—Signs of Virginity: The expert will need to have a knowledge of the evidences of virginity, because such points come up in trials, and will involve questions that must be answered. And, first, it may here be stated,

as already remarked, that the act of rape may be proven without the destruction of the signs of virginity, as commonly recognized. These questions, independently of rape cases, have importance in a legal sense. Civil cases, involving the reputation of individuals, come into the purview of the matter. In all cases touching the question of the chastity of persons and of legal investigations, the medical expert can only go by the *signs*—that is, the presence or absence of the external or genital signs of virginity. No *statements* are to be taken into the account; these are always to be presumed to be prejudiced, and are only *hearsay*, and incompetent, at any rate, while, furthermore, they relate, also, simply to matters of *fact*, and are not of a professional character.

The question whether a woman has ever or not borne children is easier determined than that of whether intercourse has or has not taken place. Childbirth is more positively destructive to the signs of virginity than the act of coition. A child can not be supposed to be born without destruction of the hymen, but conception may take place without its rupture. Again, it must ever be borne in mind that there are exceptions as to the natural perfectness of the organs affording the proofs of virginity. The hymen is not *always* present in females who have never cohabited, or it may be present and not have the common characteristics—that is, it may be imperfect. It may consist of only a fringe-like projection from the walls of the passage, and not be a membranous door to the vagina, having only a small orifice in the center, as in the natural hymen. Monsieur Stoltz alleges that childbirth may take place without a rupture of the hymen. Others, also, have declared the same thing. This may be stated as in point here: that there are, as stated before, some abnormal characteristics found in *virtuous* females that may occasion wrong suspicion. As noted, the hymen

may consist of a mere gallery-like fringe, and, being elastic, may continue its integrity, even when it stretches prominently across the vagina. It may, also, be so firm and elastic as to be capable of yielding, in virtue of this elasticity, to an extent to admit of an easy birth taking place, even when nearly perfect, without its rupture. But then such cases should be regarded as *possible* only, and exceedingly improbable. So universally is the hymen regarded as the sign of virginity, that the courts have, in all cases where expert testimony of eminent ability has not occasioned special exceptions, rendered decisions upon its proof.

If space would permit, a considerable number of very notable cases in the courts, that enter exactly into the premises, might be cited; but the matter will now be left, with the simple note of caution to the professional man in law or medicine as to the importance of the subject, not only for its nicety as a question in law, but as often involving the reputation of persons in every station in life. Nor does its importance end here, since the standing and reputation of high officials may be occasionally affected. One instance will be ventured here in proof:

In 1845 a high officer in the Royal Bombay Army (the assistant surgeon) suffered himself to speak of an intimacy (socially disreputable) with a lady of rank in the province. The woman indignantly denied the implication, and the case required investigation. The woman proved, on examination, to have the usual signs of virginity—that is, an unruptured hymen. In consequence, the officer was court-martialed, found guilty and cashiered. The defense in this case occasioned a great sensation. But this instance, in this regard, was not singular; there is seldom a case that does not cause a vast deal of discussion and notoriety.

RAPE ON MARRIED AND ADULT WOMEN.

In the case now before the reader he will not find much that concerns the professional man, because all the questions, or nearly all, are only questions of *fact*, and any other witness is just as competent. But one point of some interest is here presented that may properly and justly claim attention: It is the question whether a rape on an adult of usual strength, when in health, is *possible*? Both sides of this question have been advocated by men of prominence, and the non-professional man is as likely able to give competent testimony as the professional. It involves the matter of the power of successful resistance only. There is no special ground for pertinency of inquiry. Is a woman of ordinary physical ability able to prevent a man from forcibly subjecting her to sexual intercourse? This is the point.

The answer may here be given, that the question, in the present character of the laws as to rape, requires division. Successful intercourse is one thing, and rape, as now defined, is another. The definition of rape, as given at the beginning of this chapter, clears up this point. Undoubtedly, the rape of an adult female is not only possible, but is evidently so.

The consummation of the intercourse may be very difficult, and is certainly often successfully resisted when there is but little disparity in physical ability between the assaulting party and the resisting one.

In such cases of struggles there are often manifest physical signs of the assault, and of such a character as prove the object of the attack. The same injuries to the female organs, when resistance is made, as noted in former sections, may here be cited as likely to be discovered—that is, such as are found on girls in so far as external parts are concerned.

Pregnancy Following Rape: It has now ceased to be a question whether a woman can conceive without consent of her will, as it has become a recognized point in physiology that, so far as the function of conception *per se* is involved, it is one that is *involuntary*; it is a distinct, involuntary physiological phenomenon. That it is possible for the will, at the time of conception and afterward, to make impressions on the embryo, and entail peculiarities on the fœtus, may be most readily admitted; but this is another point.

Unconscious Intercourse is another question, formerly mooted, that has now become settled. A woman may, by deception, be subjected to intoxication, or to the anæsthetic influence of certain drugs, to the extent of such a state of insensibility as will admit of unconscious sexual intercourse. See what is said under "Pregnancy."

In the matter of examinations, it is to be borne in mind by jurists that no forcible or compulsory examination can be made; no individual, unless *consenting*, can be examined.

MICROSCOPIC EVIDENCE IN RAPE.

In the professional evidence in rape, especially when other physical signs are wanting, it is of some little importance that the microscope be brought into service. The presumption is natural that when the microscope is of use, the physician is the party to be applied to for its use. Nevertheless, this character of testimony is not of great service, as formerly considered, since the laws of our country do not require emission as a condition in proof of rape; therefore, it comes into service only as an additional availment in cases where other physical signs are absent.

The use of the microscope is had in the examination of stains that may be found on the persons or garments of

either of the parties. These stains may be from the presence of semen discharged by the assailant. A microscope of 350 to 500 diameters in power is required. The stained portions of linen, or spots on the skin, are to be gently moistened by warm distilled water in small quantity—a few drops—being kept moist by shielding with an inverted cup or capsule (touching with fresh drops of the water, if necessary) till the stain is revived in consistency. Then, by gentle pressure on a clear, thin microscopic glass or slide, the matter may be transferred and then examined with the microscope. When success follows, the dead spermatozoa, in their characteristic forms, will be detected. They are of the shape of the *polliwog*, or *tadpole*, having a large body, characteristic head, and a thin, attenuated tail; in the more obvious aspect, it is all head and tail.

Stains on garments are managed best by cutting out the portion containing the stain in a small section, and then soaking in a watch-glass or capsule with a few drops of water, as before stated, and thence proceeding. By this means the evaporation may be prevented by the inversion of another capsule over the top.

The microscope may be of service, also, in examining the mucus in the vagina of the female who is the subject of rape or intrigue, if the case be recent. There will, in case of emission into the vagina, be a continued escape of the spermatozoa for a while. These, if properly placed thereon, may be detected on glass.

RAPE UPON MALES.

This is a droll proposition, but, in law, the truth is *all to be told*, and so we are to treat of rape made by females upon males. It is in France only, however, as the author believes, where the law provisions are thus specialized for

rape. The English and United States laws afford no penalty *for this dreadful crime!* if the impressions of the author are correct.

But the French courts evince their gallantry toward the *innocent and modest gentlemen* who may be assailed by violent females. The Court of Assizes for the Seine (1842) has the record of the trial of a girl of eighteen, charged with rape on two little boys. She was convicted, and sentenced to fifteen years' hard labor in the galleys.

Another case is recorded in the French criminal courts (1845) of a girl, also eighteen years of age, who committed a rape on a boy of fifteen, named Xavier T——. She was convicted, and sentenced to ten years' imprisonment.

When all the facts are considered, the French criminal code is, after all, a very good guard to public morals and the safety of the young. The law there provides for the recognition of rape, whether the act be perpetrated *by consent* or *against the consent*, when the age is under eleven.

In all governments, of late years, the necessity has become apparent that stricter laws should be enacted for the protection of public virtue. Too many basely guilty people escaped by the advantages taken of technicalities in the law. The question of the "*consummation*" of the act first became one of much discussion. Then, afterward, the laws were so amended as to make *emission* a factor to rape. This was of such difficult proof that other definitions of rape were required. Then "*penetration*" was made the point, and the courts, especially the Scotch, required proof of *full entrance* for conviction. This was involved with difficulty, and many bad people escaped conviction, and so at length the courts defined "*penetration*" to mean the entrance between the lips of the vaginal entrance, which is sufficient to constitute rape.

As to rape upon males, it became evident in France that many young boys were decoyed by prostitutes who

were diseased, and were inoculated by syphilis. This evil proved so great that the laws concerning rape had to be extended in meaning. Thus, now we have, as the result of this necessity, a definition that contemplates acts of rape by females upon males. Very probably, in the large cities of other countries, they will soon have, if they do not already have, similar definitions of rape.

LEGAL ASPECT OF RAPE.

It has just been stated that too many wicked persons—persons guilty of social crimes—escape punishment by advantages taken by lawyers on technical points; and, before closing this chapter, a few words may be added more especially for the benefit of the lawyer, since this book is alike intended for his use and that of the medical student. The lawyer, when admitted to the bar, is not only sworn to do justice to his client, but is expected by those who employ him to do all in his power to gain his case. Litigation being his business, and success in his employment, *meaning victory* in trials, his due, it has naturally come to pass that very many *maneuverings, tricks, fictions*, etc., have come into popular use. It is very naturally expected by the public that these tricky practices will be pursued, and those most expert in their use *have been regarded as the best lawyers*. Such is popular opinion.

But it is said that all questions have two sides to them, and so we will suppose law practice has also two phases—one forcing virtue out of technical advantages and shrewd tactics; the other where strong logic, deep penetration into the merits of the case, comprehensiveness of views and nobleness of purpose is made the condition for success. Now, if these requisitions be plied with a full complement of intellectual power, the results can never be doubtful in

a law praetice. Occasionally a case may turn, as by mere accident, upon technical points, shrewdly managed, but solid work, plied by honest purpose, will win, and that at an early day. The conscientious lawyer may ever feel safe, and appropriate confidence and assurance to his inheritance: *Deus nobis hæc otia fecit.*

A case in the memory of the author affords an illustration here: It was in a trial for rape. The late Hon. W. S—— was the attorney for defendant. The testimony had been clear, decided and full, and left no hope, *on the merits of the case*, that the defendant could possibly escape conviction. When the case was about ready to be submitted to the jury, the defendant's attorney asked the court to permit the prosecuting witness to again appear on the stand. It was granted. Then Mr. S——, with a remarkably bland and kindly voice, said to the girl that he was now *done*, and wished only to have a few more words that might have a *little* to do with the case. He then went on to define what the law recognized as rape—thus: "Rape implies the act of a man obtaining sexual intercourse with a *lady* without her consent. Now, sexual intercourse [says he] is a *peculiar* proceeding; it seldom occurs without there being *peculiar feelings*. These feelings are not always agreeable to both parties, but generally they *are* so. If not always agreeable, it yet seldom happens that the one who may have the lesser enjoyment takes any occasion to *speak* of this lesser enjoyment. The minds of people are under peculiar states of feeling in such cases, and do not always agree with their bodily feelings. One may not *fully agree* or *consent* to an act, and I suppose *you* did not *fully consent* to this act, even if the bodily feelings were not repulsive. Sometimes persons have their minds affected by their *feelings*; sometimes their minds are nearly *like* their feelings. Therefore, in

the case of rape, the law, which is also *peculiar*, admits of two significations: So rape is when one is *entirely unwilling*—when the whole soul and being abhors and revolts at the very idea of having a man so near. It takes a very powerful will to have a powerful revulsion. Then there may be cases where one is *unwilling in the main*, and has not this revolting and soul-loathing against the man, who may not be a *stranger*, and may, withal, be a *charming, nice man*. No one will naturally and *fully* repel such a person as this *entirely*. I suppose this man, who is fine-looking, could hardly occasion such a complete repulsion; he would naturally take hold of some chords of the human heart. Such a case may be called *rapee*. Now, *rape* is where one is *wholly* without consent, and *rapee* is where there is *some consent*. Now, please tell me if this case is a *rape* or whether it is *rapee*?"

The girl replied that it was *rapee*! The lawyer then quietly turned to his client and said: "*You may now go home!*"

There had been some impatience with the court, and the lawyer was several times interrupted while speaking, but he was permitted to proceed until he got this reply from the prosecuting witness. All the while he was exceedingly bland, courteous and sympathetic. But his final words to his client were heard with a murmur from the audience. The attorney for the injured girl permitted him to proceed with comparatively little interruption, for he well knew where the power was reposed that would control the case. He knew his own strength, so he quietly turned to the judge and said: "Allow me, if the court please." Then, raising his eyes and face, he solemnly uttered the following words: "*God and humanity are interested in this case!*" He then turned to the girl and asked the following single question: "Did you give your

consent to be ravished by this man?" The girl, in a clear, strong voice, answered: "*I did not consent!*" Within ten minutes the verdict "*Guilty!*" was returned by the jury.

Which was the better course? The one was a shrewdly worded and cunningly laid trap to catch the witness and win the case; the other comprised a few solemn, pertinent words, that the better sense could not ignore.

UNNATURAL CRIMINAL OFFENSES.

CHAPTER XXI.

IN the present chapter the subjects treated of do not often demand the services of the medical man at court, and so the points to be noticed are only of interest to the legal man. What the law *is*, and how *far* the several cases are *actionable*—*i. e.*, the question of *extent of criminality*—are the chief ones. The crimes are mostly against the individuals themselves, but, in some instances, involve others and harm society incidentally.

SODOMY.

The unnaturalness of this crime is so absolute that it seems as if its existence would really be out of question. The law defines the crime to be that in which individuals of the separate sex, from a perverted propensity, indulge one upon the other, as man with man. Anomalous as such acts appear to the chaste mind, and preposterous as is the idea thereof, it is yet evident that from the early ages such practice existed. If history be correct, the Greeks were addicted to it very considerably. The sacred writers, in enumerating the heathenish vices among the Greeks, placed this one conspicuously in the list. The penalty among the Jews, Greeks and Romans was very severe, showing the heinousness of the crime; it was *death*. This severe penalty was also inflicted for the crime by the European laws of modern times, but at present the sentences are usually penal transportation.

In the United States the penalty is imprisonment in the penitentiary.

There are points that the jurist is to bear in mind concerning statutory laws on this subject. The crime with boys under fourteen is of different degree as to penalty ; it is then only one of *felony*. If consent of the subject of the crime was had, both are alike guilty, in adults, or persons past fourteen ; if without consent, then the one only is liable to *criminal* penalty, and the other perhaps of *felony*. As to *consent*, however, it does seem that the law is only a fiction, as it is about certain that without consent the crime could not take place. If the crime is committed by *consent*, and the subject be under fourteen, then the principal only is guilty in the higher degree, and with the boy it is felony only.

The point of proof making the case is, as in rape, *penetration*, which is defined in principle as in that case. No examination of the person can be made except by consent. The laws do not subject any one to self-conviction.

BESTIALITY.

This crime implies the intercourse of mankind with the brute kind. The thought of the existence of such a crime is exceedingly repulsive, but yet such is the case. The numerous records of the courts attest this.

Medical testimony is scarcely required in such cases. When such is in demand, it usually concerns the use of the microscope, to discover if there be any signs present of contact with the beast, as those of hairs that may be found on the clothing, where liable to contact, or of soiling from same exposure.

In this country bestiality has its penalty by imprisonment in the penitentiary. The laws are not nice in the matter of definition as to the extent of procedure that at-

taches criminality; that is, no *degrees* are recognized, and the obvious fact of one in such a position, or proceeding, as leaves no doubt of the character of the act, is the point that needs only to be proven.

It is to be borne in mind by the lawyer that the crime of bestiality is one affording convenient means of malicious or revengeful persecution, as the defensive evidence is more difficult than when two rational (if the word *rational* belongs to such connection) individuals are concerned. Here, therefore, is a chance for perpetrating great wrongs against individuals. On the part of a judge, such occasions require not only good judgment and high order of intelligence, but also skill. The notorious instance of the wise king of Jerusalem, in regard to the means of obtaining expedient proof of facts, is one in place. In that case the maternal instincts were called into evidence, and in this was evinced the wisdom of the judge.

Another case of parallel character may be here cited, relating the wisdom of Sancho Panza, when he had the brief government of Bartaria. As related, it was as follows: "This cause was no sooner ended than there came into court a woman keeping fast hold of a man clad like a rich herdsman. She came crying aloud, 'Justice, my lord-governor, justice! If I can not find it on earth, I will seek it in heaven! Lord-governor of my soul, this wicked man surprised me in the middle of a field and made use of my person as if it had been a dish-clout. Woe is me! He has robbed me of what I have kept above these three-and-twenty years, defending it against Moors and Christians, natives and foreigners. Have I been hard as a cork-tree, and preserved myself as entire as a salamander in the fire, or as wool among briars, that this honest man shall come with his clean hands to handle me?' 'That remains to be inquired into,' says

Sancho; 'let us now proceed to see whether this gallant's hands are clean or not;' and, turning to the man, he asked him what he had to say in answer to this woman's complaint. The man, all in confusion, replied: 'Sir, I am a poor herdsman, and deal in swine; this morning I went out of this town, and having sold, under correction, be it spoken, four hogs, and what, between dues and exactions, the officers took away from me little less than they were worth. As I was returning home, by the way I lighted upon this good dame, and the devil, the author of all mischief, yoked us together. I paid her handsomely, but she, not contented, laid hold of me, and has never let go of me until she has dragged me to this place. She says I forced her, but, by the oath I have taken, or am to take, she lies; this is the whole truth.' Then the governor asked him if he had any silver money about him. The man answered that he had about twenty ducats in a leathern purse in his bosom. Sancho ordered him to produce it and deliver it just as it was to the plaintiff. He did so, tremblingly. The woman took the purse, and, making a thousand courtesies and praying to God for the life and health of the lord-governor, who took such good care of poor orphans and maidens, went out of the court, holding the purse with both hands, taking care first to see if the money that was in it was silver.

"She had no sooner left the room than Sancho said to the herdsman, who was in tears, and whose eyes and heart were gone after his purse: 'Honest man, follow that woman and take away the purse from her, whether she will or not, and come back hither with it.' This was not said to one deaf or stupid, for the man instantly flew after her like lightning and went about what he was bidden.

"All present were in great suspense, expecting the issue of this suit. In a few minutes the man and the

woman came in, clinging together closer than the first time, she with her petticoat tucked up and the purse lapped in it, and the man struggling to take it from her, but in vain, she defended it so stoutly. 'Justice from God and the world!' cried she, at the top of her lungs. 'See, my lord-governor, the impudence and want of fear of this varlet, who, in the midst of the town and of the street, would take from me the purse your worship commanded to be given to me.' 'And has he got it?' demanded the governor. 'Got it!' answered the woman, 'I would sooner let him take away my life than my purse. A pretty baby I should be, indeed! Other-guise cats must claw my beard, and not such pitiful, sneaking tools as this. Pincers and hammers, crows and chisels, shall not get it out of my clutches, nor even the paws of a lion; my soul and body shall sooner part.' 'She is in the right,' added the man. 'I yield myself worsted and spent, and confess I have not strength to take it from her.' That said he left her. 'Then,' said the governor to the woman, 'give me that purse, chaste and valiant heroine.' She presently delivered it, and the governor returned it to the man, and said to the violent but not violated damsel: 'Sister of mine, had you shown the same, or half so much, courage and resolution in defending your chastity as you have done in defending your purse, the strength of Hercules could not have forced you. Begone, in God's name and in an ill hour, and be not found in all this island, nor in six leagues round about it, upon pain of two hundred stripes! Begone instantly, I say, thou prating, shameless, cheating hussy!' The woman was confounded, and went away, drooping her head and discontented; and the governor said to the man: 'Honest man, go home, in the name of God, with your money, and henceforward, unless you have a mind to lose it, take care not to yoke with anybody.'

“The countryman gave him thanks as clownishly as he could, and went his way. The bystanders were in fresh admiration at the decision and sentences of their new governor, all of which, being noted down by his historiographer, were immediately transmitted to the duke, who waited for them with great impatience.”—*Don Quixote*.

IMPOTENCY.

CHAPTER XXII.

MISTAKEN notions have been held in regard to the legal meaning of this term. Commonly, it is held to mean the inability of the male for the condition for sexual intercourse; and this meaning has been thus recognized by the medical profession, but in jurisprudence the definition is different. It implies the incapacity for procreation, *whether in the male or the female*, and forms ground for divorce, in case of its existence before marriage.

As treated by Taylor, impotency has two causes—*physical* and *moral*; but, as to duties of service, he precludes the latter from the province of the medical profession.

The more full definition of the term, or what it is meant to cover in law, needs some attention before proceeding; and, besides this, it may be proper in this chapter to treat on the kindred subjects of sterility, malformation, doubtful sex, or hermaphrodites, etc.

These subjects are not only of professional and general interest, but have their several legal bearings, so that not only the medical man, but also the lawyer, has occasion to inform himself thoroughly in regard to them. The court records abound with cases that have been tried, and although the decisions in the different countries, and in the same, at different periods, have been various, there is now a comparatively settled order of things in this direction, or sufficiently so to admit of safe proceeding.

Causes: Impotency may arise from various causes, as congenital malformation, physical injuries, diseases, pa-

ralysis, age, etc. Some cases admit of remedy or cure; others do not. Congenital cases, often without remedy, are not always so. An imperforate and preternaturally firm hymen, that may prevent sexual intercourse, may be relieved with great facility, and the case be as if no such difficulty had ever existed. So, also, with various other congenital obstructions. Cases of impotency from diseases may also admit of remedy.

It is held as a principle that when impotency comes on after marriage in persons who were perfect in this regard, it is not a proper ground for divorce; but there have been different rulings on this point.

Impotency is applied to the age of childhood in the practical sense, and the age at which the change to practicality comes on is what is called the age of puberty, which is, as the word implies, when the genitals are ornamented with hair and have become fully developed, which occurs in this country at from thirteen to seventeen years of age. In this country the plea of ineompetency is good in all ages before fourteen in prosecutions for rape.

Procreative Power of the Male: Boys of younger age may have capacity for sexual intercourse, but the capacity to procreate does not come on before the development of the testicles, or age of puberty. Such is the law recognition, and such, too, are the facts with persons in this country. But it is different in India and other hot countries. Convictions for rape have taken place against boys at an earlier age. Dr. Cheever reports a case, quoted from the "Nizamut Adawalt Reports," of a conviction of rape at from thirteen to fourteen years of age.

The criminal code, in late years, does not fix the age *definitely* at which the crime of rape attaches, since the definition of rape has been settled by the term *penetration*.

The physiological test for the power of procreation is made by the microscope. The semen is examined for the

presence of the spermatozoa. Without their presence no offspring is produced.

Procreative Power in the Female: With the female the case is more readily determined in general, it being set to the time when menstruation takes place. This may be as early as twelve years of age in this country, and ten years in warmer climates, as in India.

But menstruation is not always certain, and, although impregnation does not usually occur at an age when the person does not menstruate, cases have so occurred, and the fact is recognized. The presumption and rule is that menstruation proves the age and time of capability. This being the fact, the other fact is also recognized, that after menstruation ceases by old age, child-bearing also stops. This is in accord with the facts of nature; but even here there are rare exceptions.

IMPOTENCY FROM AGE: It has already been stated that the power to procreate does not come on until puberty, and (speaking of females) that after menstruation ceases (*turn of life*) child-bearing ceases. But still more must be necessarily stated when the question of impotency takes its legal aspect. The extremes and the possibilities are to be taken into account. The case of Abraham and Sarah, in the sacred account, presents an example of possibilities. Dr. Taylor (*"Medical Jurisprudence,"* p. 724, 1880), says: "Facts tend to make it highly probable that a fecundating power may be retained by the male up to the age of one hundred." Dien, of the Invalides, Paris, examined the bodies of 106 men between the ages of sixty-four and ninety-seven, and found sixty-one per cent. having conditions that would admit of fertility—that is, the seminal vessels of this proportion of bodies contained spermatozoa. Dr. Ruttel gives an account of a man who was married at the age of ninety-two, and afterward had two children by his wife.

The medical man can only make his testimony definite by his discoveries with the microscope; but, as such examinations can only be made by concert of purpose, this means is contingent, and he can only, in such default, testify as to the probabilities and possibilities; hence the evidence is only corroborative.

The virility or propensity making the male capable of *erection* is more persistent in many cases than the fruitfulness. Some men have this propensity at a greatly advanced age, and when they may be incapable of becoming fathers of children; but, as questions of legitimacy are those most likely to arise on this point, it is unnecessary to go further here, as that subject has been given special attention. See "Legitimacy."

CONGENITAL IMPOTENCY: 1. *In Males*: The existence of congenital impotency is rare; but still such cases do occur. It is not often that the courts are troubled with them from complaints of males, because the deficiency is most frequently caused by lack of function in the testes; and then the tendency to marriage is also wanting. The testes are sometimes entirely wanting, or they may lack in development; sometimes they may be in a state of degeneration or unnatural growth. Instead of being of glandular structure, they may be simply of a fleshy or gristly form, from *orchitis in utero*. The epididymis may be imperfect, or also the spermatic cords. The penis may also be defective, or even, in very rare cases, wanting. It is extremely rare that litigations take place in cases of impotency from this cause, as it is so very inconsistent that a person in such a situation offers marriage.

2. *Congenital Impotency in Females*: It is equally uncommon that impotency of this character exists in females. There are cases of various malformations, although—as stated of males, so in females—congenital impotency is uncommon. The parts that are complicated may be the

ovaries, the uterus, vagina or hymen. The ovaries may be wanting or of unnatural substance. In such cases litigation is very unlikely, as there is hardly any propensity leading to marriage. In cases of imperfect uterus there may be abnormal growth, and a filling up of the pelvis and vagina. There may be an imperforate hymen, or there may be a state of dropsy. Other abnormal states may also exist. A case is recorded by Dr. Beck ("Medical Jurisprudence," Vol. 1, p. 104, 1838) which occurred in Paris, under the notice of Dr. Fodere. A lady of twenty-five, in good health, married, without suspecting anything wrong, had failed in ability to consummate the nuptial object for six years. She then consented to be examined, and was found to have an imperforate vagina. She submitted to a surgical operation by Dr. Dejours, who opened the vagina to the extent of some inches, in the hope of cutting through the obstruction; but this secured no benefit, as there was still no passage further on. Her husband now applied to the court for a divorce. The testimony of two eminent surgeons (Levret and Sau-met) was that the difficulty was not certainly beyond surgical remedy, and the divorce was denied. But this testimony was rebutted by two equally eminent surgeons (Drs. Petit and Moraud), who declared that the case was without remedy, and it was evident to them that neither before nor after marriage was there any opening in the vagina. The lady died in about ten years afterward, and, being examined, it was found that the vagina and uterus constituted a continuous solid body. A number of cases of similar character are recorded in medical journals. In the French "*Dic. des Sci. Med.*" Vol. 4., p. 166, Hufeland gives an account of a supposed girl who was found to have no internal genital organs.

Imperforate hymens of permanence and solidity are reported somewhat numerous. Dr. Moulon, of Trieste

("Littel's Jour. For. Med.," Vol. 1, p. 376), gives a case where the hymen, and all above to the uterus, was permanently closed. In the "American Journal of Medical Science," Vol. 2, p. 193, a case of vaginal *cul de sac* is reported. In this case the external organs were well formed and the breasts full, but there was no uterus. Just such a case is also given by Dr. Edwards in the same journal, Vol. 13, p. 79. Cases of permanent *prolapsis uteri* are also met with, which are so extensive as to close up the vagina.

IMPOTENCY FROM ACCIDENTS AND DISEASE—*In Males and Females*: Such cases are more frequent than congenital cases; and, where lawsuits are instituted on grounds of this character, the cases are almost always unsatisfactory, owing to the difficulty of securing clearness of testimony, or of proving fault or deception. When occurring after marriage, a suit is generally barred; when before, and the facts are concealed, there is so much force given to a plea for divorce that verdicts have been secured. But courts are disinclined to give divorces where accidents, sickness or other unavoidable causes of impotency come upon either the husband or the wife, when they are unblamable, although such disabilities may entirely preclude the possibility of sexual intercourse. The medical witness, in these cases, can only testify as to what he discovers on inspection. This can only take place by consent of the party. But scandalous diseases, existing, or having existed, as a cause of impotency, where the mate of the party can produce clear evidence of the fact, makes such a case decidedly actionable as a ground for divorce; and this because adultery is implied in the case.

Syphilis is a very fruitful cause of impotency in both sexes. In such cases the medical expert is seldom at a loss in satisfying himself or the courts.

LEGITIMACY.

CHAPTER XXIII.

THE legal presumption of legitimacy is, that every child born, either in lawful matrimony or within a period after the death of the husband that comes within the natural duration of pregnancy, is, in England and in this country, the child of the husband, unless the contrary be clearly made to appear by proper evidence. With this evidence the medical and legal profession are alike concerned, when such testimony is required. And there are, perhaps, no points in law, where medical evidence is required, that bring out an equal amount of *contesting*, and where thoroughness of information in gynecology is more required.

There is a Pennsylvania decision, *Dennison v. Page* (5 *Cascy*, 420), that makes a precedent, although the precedent has elsewhere been contested, which is one to be remembered to sustain a point of importance. In this case a child was born three months after marriage, which the husband instantly disclaimed and never during his life recognized. It was held in the case that where a child is born during wedlock, of which the mother was visibly pregnant at the marriage, it is presumed, *juris et de jure*, to be the offspring of the husband, because he would not marry thus otherwise; and its illegitimacy can not be proved by the mother after the husband's death. This point may be one on which the ownership of great estates may often be contested. At first blush the case may seem to be one that simply involves mat-

ters of *fact*, but it may be quite otherwise. Points may be brought up as to the capacity of the husband at the time of conception; this may relate to his age, state of health or other bodily infirmities that existed at the time. The facts so brought up may have to be passed upon by the medical expert. Thus the law is specific in English practice, and mostly so in America, that a child born during marriage is deemed illegitimate when by *good medical* or other evidence it is proved that it was *impossible* for the husband to have been the father thereof.

Time of Gestation: The great point concerning questions of legitimacy is that of the natural time of gestation and the limits of possibility. These questions should be well understood both by the physician and lawyer. Now, although this period concerning the full duration of gestation is somewhat definite, and amounts to about 277 to 280 days, or 40 weeks, and commonly called nine months, yet circumstances vary this somewhat in some cases. It is observed that young women usually go a shorter time than old, and robust ones shorter than feeble ones.

One cause of discrepancy in reports of time of gestation arises from the different dates of beginning the count. Usually the calculation is made from the time that menstruation last occurred. But then the impregnation may not have set in at that exact time; for although conception more frequently occurs shortly after a period of menstruation, it does yet occur at all periods between the courses; perhaps least frequently in the middle, somewhat more common just before, and most common just after.

The only reliable way of determining is in cases when only one intercourse has taken place, and its date is noted. Such cases are reported in sufficient numbers to make good service. Still, however, even this exact means of

determining has evinced slight differences of periods. Dr. Oldham, who is good authority, gives the average as 280 days, and has taken this from cases of single intercourse. He gives nine such as follows:

CASES.	DAYS.	CASES.	DAYS.
No. 1.....	266	No. 6.....	281
No. 2.....	268	No. 7.....	283
No. 3.....	271	No. 8.....	284
No. 4.....	280	No. 9.....	285
No. 5.....	280	.....	....

In this table the cases of Nos. 4, 5 and 6 were those of the same woman at different births.

Dr. Loekwood gives the following, which gives notings of respective ages, and of the number of confinements respectively, as also weight of one child:

CASES.	AGE OF WOMAN.	NO. OF DELIVERY.	DAYS.	WEIGHT.
No. 1.....	19	1st	272	....
No. 2.....	30	1st	276	....
No. 3.....	17	....	270	....
No. 4.....	44	7th	284	14

These cases above date from a single intercourse each.

Another series is given by M. De Villiers, the French writer, which makes the extremes still greater, and all were from single intercourses respectively, except those of hyphens (-), which note the periods between: 229, 246, 257, 267, 301, 276-281, 278-283, 270 and 266-272.

If an effort is made to explain this great difference in the time of gestation, which, in the last series given, amounts to seventy-two days, the following important particulars are to be taken into account: First, it may be

noted that there are, in other respects, correspondingly great natural differences in persons: there is difference in quickness and fullness of pulse, and of respiration; there is difference in stature and vigor of constitution, as also in the power of enduring pain, fatigue, hunger, thirst, loss of sleep, etc. Then another matter is to be observed, which is the difference in the habits of different individuals, as to their diet, occupations and exposures to hardship and toil. In the last series given, it is more than likely that the shortest period of gestation given, 229 days, was not a full time case and should not be taken into the account. If it be left out, then the extremes denote fifty-five days, which is still very great. On the other hand, the one case, 301 days, is so extraordinary that it may be regarded justly as abnormal, and so should also be left out of the account. Then the extremes are apart only thirty-seven days, and, as the higher extreme is in one of the indefinite numbers, it is proper to take only the definite ones, where only a single intercourse had taken place, and this will bring the extremes apart only twenty-four days.

Limits of Possible Live Births: Next to settling the natural time of gestation, there is the limit of possible *live births*. Here are to be found variations, also, and such as are still more remarkable. Obstetrical records show that children brought forth at as early a period in gestation as seven months may live and do well, and, if we are to believe Dr. Ahlfield, a German physician of large experience, and who reports estimates on lists as great as 425 cases, then we are to know that at least one gestation has gone so long a period as 313 days.

Perhaps, as these points may not be justly disputed, it is proper to place the possible extremes to the points indicated, thus: Shortest live birth, 210 days, and longest gestation, 313 days. But the average of full and natural

gestation is properly placed as 275 to 280 days; variations of a little below, as one to three days, and as many above, are common; but this is the bounds of the average, throwing it within five days, as between 275 and 280 days.

Reference to what was stated on the *stages of fetal development*, in the chapter on "Delivery," may be of use in refreshing the memory on this matter. But as a matter of convenience at this point, there is here subjoined a report of Dr. Taylor, of an average case, in notings of stages of development: Cessation of menstruation September 16th; intercourse occurred September 20th; quickening took place January 23d, and the full developed child was born on the 28th of the following June, making 281 days of gestation. This is now nearly an average case, and so it is as well to give the particulars of extremes. Dr. Taylor gives a possible extreme of a live birth at six months, or 180 days after conception, but states that in such cases the child usually dies soon after birth, even under the best of care.

In the "British and Foreign Medical Review," Vol. 2, p. 236, is an account of a child aborted at the fourth month, which lived for some little time. M. Maisonneuve reports seeing a woman two hours after an abortion had occurred of a four and a half months' pregnancy. He found the fœtus in its membranes, and, on opening these, saw the fœtus moving. On applying warmth, he partially succeeded in restoring it, and it began to breathe, somewhat irregularly, but died in six hours.

A fœtus was exhibited by Dr. Ellis before the London Obstetrical Society which had gone five months and ten days from the time of the last menstruation. When brought forth it cried loudly, even as other children at full time. It passed meconium, but no urine; it swallowed without trouble; its eyes were closed; it grew cold,

without possibility of keeping it warm, and died in forty-eight hours after birth. Its weight was one and a quarter pounds, and its length eleven inches.

A *living birth*, as recognized by the law, is one where the child *notably breathes*.

Appearances in Premature Births Compared with Time of Gestation: The medical expert should be familiar with the appearances of children when prematurely brought forth, so as to be able to give intelligent testimony in cases where the time of gestation is the question. Very great importance attaches here. In these particulars the size of the child can by no means be relied upon, because fully developed children, born at completion of gestation, vary greatly in size—all the way from two to fifteen pounds, or even more. It is the state of maturity that is to be taken into the account. A seven months' child can usually be easily recognized as immature, but one of eight months can not be readily determined. The great changes in the fœtus which bring it into existence as matured occur within the limits of the eighth month. At the beginning of this month the fœtus can be pronounced as not having passed the eighth month, but at no time afterward can it be well known how many days older it is than eight months. After this period it is guessing, although an experienced accoucher can usually guess pretty well in these particulars.

For practical and brief noting in questions of legitimacy, the following particulars may be given :

If a child be presented, claimed to be born legitimately, and is brought forth within six months of marriage, and the child lives, breathes naturally and takes food, it is *possibly* legitimate, but should be suspected. If it evidently appears not to be developed, is not living and never breathed, it most probably was begotten within wedlock.

If at seven months a child is born that is, in appearance, fully developed, it is probable that it was begotten at an earlier period than seven months before.

If born at eight months, and seems fully developed, it may be legitimate, but is *doubtful*, and, as time goes on after the eighth month, the doubts must give way. Nevertheless, the late Baron Simpson, whom the author knew personally, ventured to pronounce, in a court case where he was a witness, upon a *time* even *less* than the one month, it being only *three weeks* before full gestation; yet he pronounced it, from appearances, to be illegitimate. He was a man of very extensive knowledge and experience in obstetrics, having been a practical accoucheur and professor in obstetrics for many years. In this connection he stated that a fully matured child, to be born three weeks in advance of the end of fully forty weeks, is quite as unlikely as that a man shall live to be one hundred years old. Still, it is, as Dr. Taylor says, a venture that few medical witnesses would be willing to make.

On the other hand, Dr. Ruttel, also quite an experienced observer, reports himself as having met with several instances in which women have been delivered *two*, and even *three*, weeks before the full term of 280 days, and the child appeared to be *perfectly formed* and *fully matured*. Hence, it is not safe for a medical witness to presume upon his knowledge as to a time closer than, say, one month.

For particulars in comparing degrees of maturity of fetuses with time of gestation, see chapter on "Infanticide by Violence," Chapter XIX, and under "Viability, or Uterine Age of Fœtus;" also table at end of volume.

Protracted Births: More important still than premature births are those that go beyond the normal period of forty weeks. The ownership of large estates may sometimes be dependent upon testimony on this point which an expert

may give, for he may lead a court into error in the matter by his testimony, and also set wrong precedents; furthermore, the reputation of persons as to chastity may be seriously damaged by blunders in the premises.

It has already been stated in this connection that gestation may run over the natural time many days, even up to 313 days, and now, to make this matter come to a more defined status, a table of retarded births, compiled by the very best authority, will here be given, which is recognized by all writers. It is by Dr. Merriman. The table comprises 114 cases, and indicates the ratio of births at the different periods at which they occur. He takes the cases as dating from the time of the last menses to the delivery :

WEEKS OF GESTATION.	NO. OF BIRTHS.	WEEKS OF GESTATION.	NO. OF BIRTHS.
In the 37th week.....	3	In the 41st week.....	22
In the 38th week.....	13	In the 42d week.....	15
In the 39th week.....	14	In the 43d week.....	10
In the 40th week.....	33	In the 44th week.....	4

In the celebrated *Gardener Peerage* case before the House of Lords in 1825, there was testimony adduced that corroborates the above table. One case cited dated the delivery to the 303d day after last menses; another 309 days after. The case before the House required 311 days, and the objection offered by the contesting party was that dating from the time of last menses was too indefinite to allow of the proof by analogy, because the conception may as justly be dated forward to the beginning of the following course of the menses. There could be no proof that the conception dated back to the antecedent cessation; for while conception does, indeed, more likely take place soon after menstruation, still, as it *may*

take place at all the intermediate periods, the case can not be rested on such testimony; it requires *positive*, and not *negative*, testimony.

In a work on "Human Pregnancy," by Dr. Power, a case is given of the duration of pregnancy for 325 days.

But now, if the cases of *abnormal* durations are to be cited, then the present author can go considerably further: In this instance a veritable conception had taken place two years before he was called to the case, and the child had not then been fully delivered. The case was a very remarkable one; many physicians had been in consultation, and various expediences had been resorted to, but only with poor effect. The child was dead in the uterus. At the end of the usual period of pregnancy the woman went to bed, and was in continued ineffectual labor for many days, when the pains all left her, and no signs whatever appeared afterward of the usual characteristics of accouchment. It was then that the consultations were held, but the conclusion arrived at was that, as the woman was in rather a comfortable state, in so far as the urgency of labor was concerned, and was, furthermore, able to be about on her feet with the usual convenience, as experienced in advanced but incompleted pregnancy, the case had best rest until nature should afford indications of what should be done. The case continued on thus, but not without interrupted periods of pain, as of approaching labor, until about six months had passed, when fœtal bones began to be expelled from the uterus at irregular intervals. There was not a great deal of offensiveness of odor, as might be expected, but bones continued to come away: first, such as were mostly entire, as a femur, a humerus, and other long bones, then fragments began to come, and continued to pass off, until it was supposed that about one-half had come away.

It was at about this juncture that the author was called in consultation. The woman was at the time able to be about the house, would occasionally take a carriage ride, and had an ordinarily good appetite. She was still permitted to pass on unmolested, as had been done for about a year's time, and, being heard from a year afterward, was found to have continued to improve, and the lady was then in nearly a complete state of health, except there was no menstruation, nor other uterine discharges of note. In the latter year the fragments that came away were small. She had a husband, and now had habitual conjugal relations with him, involving no inconvenience.

Such are some of the extreme and abnormal cases that come into professional history; but such are not the cases that come into the category of cases that establish rules of court or principles of Medical Jurisprudence.

Before leaving this topic, it is proper to mention a point that will not only go to explain some of the discrepancies in reports of limits of gestation, but will also be found ground for fixing more advanced points in Medical Jurisprudence, when more fully attested. It has been well observed that conception does not always take place at once when intercourse occurs. There is a time, which may be speedy or not, when the semen, or its spermatozoa, is or are taken up and carried to the ovaries; hence, the fertilizing of an ovule may take place *speedily* or *not*. Thence the disengaged and fertilized ovule must pass through the Fallopian tube to the uterus; this may be *speedily* or *not*. For all these steps in the function of conception there may be the time of some hours or some days. There are authorities that rate the time to be a period of from one to two weeks.

What has been stated, many times, of the possibility, or even the certainty, that the exact instant of conception

has been known, may be or may not be true to the facts of nature. The feeling that is referred to as that of the instant of conception is one of peculiar pleasurable satisfaction, that comes on in an instant. But this is assuredly a mistake, because the experience thus cited does take place, whether or not there be a conception at the time. Those who are possessed of the capacity or opportunity for such sensation can know well that, if they were to have children in every instance that the cited crisis of pleasure is experienced, the population of our globe would soon be pretty dense.

The best ascertained facts concerning the time or juncture of conception, be that instantaneous or not, prove that it is rather otherwise than cited—that it is really an experience of *disagreeable* sensation rather than *agreeable*. There is usually nausea, lassitude and sense of nervous debility following.

Now, therefore, this difference of time elapsing in the act of conception—this retardation by a variety of causes, be they constitutional or casual—is surely to be taken into account when judgment of time is to be given.

Again, the time of delivery is to be taken into account, or, rather, it is *not* to be taken into account, and must be excluded when the reckoning of gestation is made. The fruit is ripe when the labor begins. Then, if the labor be protracted by accident or debility, mechanical obstruction or any other extraneous cause, this retardation does not go into the reckoning.

In this country, and also in England, the *exact* term of gestation is not fixed, but is recognized as *about forty weeks, or 280 days*; and a variance of two weeks, either way, comes within the recognized period.

The code of Napoleon disposed of much professional service, brought the question of legitimaey into definite terms, and resolved the matter into the question of *fact*

simply. He set 180 days after marriage and 300 days after dissolution or non-access as the period of legitimacy.

In Germany, the period of protraction of gestation is laid down at from 301 to 308 days, but not beyond. The general law of that country places the ordinary period of gestation at 285 days, but for a married woman divorced, or whose husband has died, 302 days are allowed. It is conceded by some authorities that gestation in Germany is slightly longer than in America, and the common law period has been pronounced as unjust. The claim is that, if the time is to be arbitrary, it should be from 322 to 336 days, as the ultimate limit for protracted or extreme cases. It is surely more reasonable to leave the case open, as in the United States.

To show how much importance attaches to professional evidence in questions of legitimacy, and also to show how far moral questions may control the facts of science, the famous case of Henry Fenton Jarvis, *alias* Gardener, usually called the "Gardener Peerage" case, may be again cited. There was a great estate in the issue, and as many as seventeen medical experts, comprising some notable personages, were in the House of Lords as witnesses. Five of these witnesses fixed the period of gestation at 273 to 280 days. On the other side, there were twelve that agreed on the same time as the usual period, but they placed the possible prolongation at 311 days, which would have given the estate to the plaintiff; but, as the mother had been proven to have been in a state of adultery, the moral aspect of the case controlled the facts of science, or physiological laws, as declared by the twelve professional men. The peerage admitted the proof of *possibility*, but allowed the *improbability*, and then the lack of *constancy* in the mother was made the determining point in the case. Medical experts need not, therefore, after such an extraordinary example of the moral element as a factor in formulating decisions, pass to their *discredit* such adverse decisions.

PATERNITY.

CHAPTER XXIV.

IN much of the bearing of this subject there is a sameness to that of the former, in Chapter XXIII; but there are other points that do not belong to that, while this has a more limited range.

Occasion must be taken, also, in this chapter to treat of kindred topics that do not come readily into other connections, but which claim their importance in Medical Jurisprudence.

Disputed Paternity: The law, as has already been stated, maintains a fiction in regard to parentage when a child is born in wedlock. It does not pretend to say absolutely who it was that begot the child, but *constructively* makes it the child of the husband, though possibly it may be the child of adultery; but yet, on the other hand, the law enables parties to determine for themselves by the proof of facts. The means are by evidence of events and by skill in detection. There is recognized in descent the transmission of resemblances of person and likeness of habits and proclivities, which, although not always present, nor yet generally in groups of appearance, yet, singly and collectively, more or less, these resemblances may be sufficiently complete to make good grounds for determining parentage. These particulars are called the evidences of *paternity*. They seldom, however, come into the courts, except in cases of *bastardy*. But, when such evidence is produced, though it may be affirmative, it is yet only taken as corroborative; alone, it is not sufficient to make a case.

Suits involving such testimony have gone into high courts, even the House of Lords, and the objects have been as high as the peerage itself. Thus, in May, 1843, the case of the "Townsend Peerage" came into suit, and expert testimony was admitted by the House of Lords in England; also, in like manner, the "Douglas Peerage," which suit occurred in 1767-'69, in which fourteen persons were brought in as expert witnesses. This case had gone through the Scottish courts, where fifteen judges devoted eight days to deliberation on the case; but, with all this effort, that exhausted the skill of many physicians of the greatest eminence, the case had to go to the House of Lords. The pertinency of Lord Mansfield's views as to evidence of parental likeness has record in the following language: "I have always considered likeness as an argument of a child being the son of a parent, and the rather, as a distinction between individuals in the human species is more discernible than among animals. A man may survey ten thousand people before he sees two faces exactly alike, and, in an army of a hundred thousand men, every man may be known from another. If there should be a likeness of feature, there may be a difference in voice, gesture or other characteristic, whereas a family likeness runs generally through all these, for in everything there is a resemblance, as of feature, voice, attitude and action."

The late "Tichborne" case (1873) brought into court a number of witnesses who were ready to be sworn on the question of likeness. One witness in this case testified in the following positive language: "I have known the Orton family for many years, and knew Arthur (the claimant) from his infancy up to the time of his leaving England in 1852. In 1870 I saw the claimant, who then represented himself as Roger Tichborne, but I recognized him at once as Arthur Orton." On the cross-examination

he said he knew him, "not from likeness of features alone, but from the whole appearance of the man—his figure, tone of voice, features, all confirm it."

It is obvious that what is to be considered in this matter relates more to the duties of the lawyer than to those of the doctor; judging of the competency of evidence is the thing in point. And it seems that a physician is not very likely to be able to judge of personal likenesses in any degree more than other individuals; but in some other points that are to be considered in this chapter the medical expert may be of service.

Affiliation: Medical opinion may be of service in this particular when the evidences go to show transmission of certain diseases or morbid specialties. Syphilis comes into this category; also scrofula, and some contend that phthisis does, also, but no medical authority can assert positively; it may be declared to be probable, however, and inspection may be necessary for giving evidence. Peculiarities, such as supernumerary fingers, thumbs or toes, harelip, etc., also come into the category. Here the testimony may go to prove it presumptive. But it can not be positive, since it is a fact that these eccentricities do occur spontaneously. Nevertheless, the presumption is strong, because it is known that such peculiarities as supernumerary digits, etc., are often found in families running along for generations, and also cropping out in several individuals in the same families. So it is, also, in the case of harelip. Spots, marks or discolorations (mother's marks), are sometimes noticed in families where the parent bears them. Of course, such instances are generally not to be looked for in cases which may come up, but they serve to prove the principle of transmission. And there are other particulars and peculiarities, less specific though they may be, which are yet of

sufficiently determinate character to make a case. Many of these particulars come into the category of matters of *fact*, and require no expert testimony.

POSTHUMOUS CHILDREN: The law has been stated to involve a fiction as to the legitimacy of children born in wedlock, making such the legitimate offspring of the husband. But here comes now a new principle that is also law, and which comes in with an exception to the former. An example may be supposed for illustration: A widow marries speedily after the death of a husband; she has a child in a period afterward that involves a doubt as to parentage. In this case the legitimacy is settled by the law that constructively makes the present husband the father; but what the real fact is can not be thus settled. There are two reliefs that come to this case, and prevent what would otherwise be embarrassing to the courts: *First*, the law concerning legitimacy, which determines the question of inheritance, relieves the case from difficulty as to property; *second*, the rules of society which discourage speedy marriages relieve the case from moral complications.

There may, however, be grounds to render an appeal to the courts an occasional occurrence. A want of access on the part of a second husband within the necessary time for parentage may be proven. A man may marry a woman at the instant of going aboard of a ship for a voyage, and so be absent; or he may become immediately disabled, or, in some other way, be positively proven to have been barred from access. This will modify the case regarding the legitimacy, and will clear it from embarrassment concerning the paternity.

It is only in such an instance as a suit for slander that a case is likely to go into court concerning paternity of

posthumous children. And in such cases evidence concerning matters of *fact* and testimony on professional points may both be required, according to the circumstances.

SUPPOSITITIOUS CHILDREN: This brings up a case where litigation may occur, and which may require professional evidence as well as evidence on simple matters of *fact*. A supposititious birth is one in which childbirth is *feigned* to take place or to have occurred. The motives for such proceeding are various. They may be for the purpose of enforcing marriage, or with the object of extortion, or for benefits of inheritance. The opportunities for fraud in such cases may comprise events of the birth of a child that may be removed and another substituted, or the incident of the birth of a dead child, which may be more easily disposed of and replaced by a living one; also, when an abortion of advanced gestation may have occurred.

Extremely rare cases of lawsuits take place when the opportunity is not thus afforded, such as in one or another of the present named cases, because professional and *fact* evidence would at once detect the imposition. Nevertheless, even such cases have appeared, as is evidenced in the instance of the "*Wicklow Peerage case*," 1870; and still another English one, the "*Lady Gooch*" case, 1878. In both of these cases no birth by the woman had occurred. The child had been surreptitiously procured in each case; but the fraud was detected.

SEXUAL MALFORMATION: Rarely is it the case that court trials arise on questions of legitimacy based on proofs of incapacity from deformity. Still, such may occur. There may be cases of persons entering the marriage state who are physically incapacitated for the con-

summation of the marriage object, and, while no trouble may have come out of the case as between the two individuals, there may yet be litigation on the question of legitimacy in regard to offspring which may follow, since the one may be capable for such while the other may not be. When this disability is on the part of the husband, then adultery may be alleged. Such a case would require the professional services of a medical man.

But trouble may also arise between the parties themselves. The case is the more aggravating when an imposition is perpetrated by a party who has gone into the marriage state with the knowledge of his or her incapacity for consummating the nuptials. It is obvious that a medical man is alone competent to give the proof in such a case on which a court decision may be rendered.

HERMAPHRODITISM: The definitions in the several varieties of malformation that are known under this term are named respectively *androgynus* and *androgyna*—the first when the general appearance is that of a male, with sexual organs partaking of the female character, and the latter when a woman-like general appearance has such defective sexual organs as take on the characteristics of the male.

A marriage of persons of such deficiencies is regarded in law as fraudulent, and the subject of the deception is entitled to a decree of divorce. Such cases are not, however, without their difficulties to the courts and to witnesses when a suit is admitted. Competent testimony must be that of a medical man, or one possessed of anatomical and physiological skill and judgment; but the deceiver is the defendant, and the law exempts all persons from the necessity of inculpating themselves, and so an examination can not be made except by consent. This may not be allowed. All such cases, therefore, do not

readily admit of remedy by law. As to sex, the hermaphrodite is, lawfully, classed with that sex to which he or she bears the greatest likeness.

In this country, where entailments to males are not in order, and where right to title does not exist, there is little importance attached to the question under discussion, except in marital affairs.

MONSTROSITY: There is no necessity of discussing the subject of monstrosity, if the term be restricted to the participation of the human with the brute form. There can, in such case, be no claims by this subject other than that of *humane treatment* and care. There are no citizenship rights or inheritance; they are simply outlawed.

If the definition is made to apply simply to human beings who are of a character out of the natural order, and which only involve the question of sex or the sexual organs, then the case relates to that or those of the preceding subject, to which the reader is referred.

If matters of marriage are not concerned, the case of monsters is not likely to come into court, except as objects of public charity, in which case the testimony of the medical man *may* or may not be of need.

INSANITY.

CHAPTER XXV.

Definition: It is by no means necessary here to go into a general definition of the subject of insanity. This work is devoted to Medical Jurisprudence, and requires a treatment of topics only that relate to medical law. Only the medico-legal aspect of insanity will, therefore, receive attention; otherwise, the intended limits and use of this work would likely be far overreached.

In the eye of the law, the insane individual holds relations prominently: (1) With his own rights of person and protection; (2) the rights and protection of society; (3) the rights and duties of the immediate relatives and the community where such insane person lives or is found to be.

Insanity, however, appears of different types and grades of development, which have special designations, and which are best defined and treated of under special sub-heads, which will follow. It may, however, be first premised that the types and degrees of development of insanity are not of natural distinctions, and no arbitrary classification can be made practicable; but there will be found a great convenience in such separate treatment of the several characteristics, and, moreover, the common usages are in accord with such manner of handling the subject. Thus, for instance, we have, under the general idea of insanity, what is known as *mania*, *monomania*, *dementia* (craziness), *amentia* (idiocy), *mania a potu* (delirium tre-

mens or drunken craziness), etc., all of which come familiarly to the mind as natural divisions or types and degrees of insanity.

MANIA: By this term is usually understood the more violent and raving sort of insanity, wherein the reason is completely dethroned, and those so afflicted, with all their physical might (and, as some think, *extra*), act in every degree of extravagance. Such persons are never safe free from restraint, as they are liable to perpetrate all manner of violence, to themselves and others.

This character of insanity is that which, in the inception of Christianity and during medieval, if not in recent, times, was by many persons called "*possessed of the devil*," and with whom abjurations were practiced and exorcisms imposed.

Civilization and education have now secured to us more rational views of mania; but, in stating this, it is done without any purpose of involving the moral aspect of the question, as it is not possible to take a full professional and legal view of the subject here, so as to define the various *causes* of mania, whether they be moral, as that of the possession of an evil spirit, or of overwhelming grief, horror, or even joy, and, though greatly more pertinent, the physical causes can not be analyzed or dwelt on to a great extent. It is well to take up this vast and intricate subject as the mathematician takes up his figures—that is, "*take them as they are found*;" so with this, treat the subjects as they are, and as they relate to law.

In mania, all the perceptive powers are in the greatest activity, and so there is every impulse to action. On the other hand, there is, more or less, a lack of all the moral powers of reflection and judgment; hence, the persistent and inveterate energy manifested in every measure of irregularity and disorder. All restraint is similar in

effect to that offered to the natural physical forces when disturbed: it is antagonized, except by the merest chance. If the mania be complete, then all acts are indifferently repelled, however kindly offered, and it is only in the measure that the mania lacks in completeness that any kindness or other motive is appreciated by the maniac.

In view of this fact, what, then, is the proper demand of law? It is that, by humane but sufficient force, such person be immediately arrested and placed in a state of restraint and protection suited to the case. In most civilized countries there are state provisions for this purpose. Asylums of excellent character (be it said to the glory of our age) are in *almost ample* supply. These are usually well managed, and the best methods known in treatment are brought into speedy requisition, which are largely successful.

Physical and Mental Causes: It is extremely difficult to point out even the main causes of insanity. Sometimes it is hereditary; generally, it is noted to set in after a predisposition that is manifested irregularly, sometimes for a longer, and again, perhaps, for only a very short time. The exciting causes are emotional feelings, imposed surprises, undue pressure of care, loss of property or friends, public calamities, intemperance; various diseases, especially those affecting the brain and nervous system; injuries to the brain, as from a blow or projectile; congestions: cephalalgia; religious or any other fanaticism; long-continued and intense thought on any difficult subject, and any other incidental impression on the mind or brain that is liable to suddenly throw its functions out of the usual habit.

Detection: It is not necessary to state much of the means of detecting approaching mania. The signs are various and irregular, and, withal, so obvious as need no explanation here. Any one can tell when one *acts like a*

crazy person. Still, the following few particulars may be borne in mind: It should be ascertained what is the real element of insanity—the precipitation of the *mind-force* upon the perceptive, at the expense of the reasoning, reflective and moral powers. This will be noted first in the eyes, because the optics afford the most prominent signs; the eyes stare, revolve unusually quick, are flashy, and, withal, look glassy because of the intense pressure of sense by the exciting cause. Next is the sense of hearing, and a starting at sounds of every kind is observed, no matter if even common ones, for now all is reversed. Next in prominence there may be no special sense, but all the ingoing impressions are exciting; the reflex or outgoing, as of voice or language, or any other executive function, will be noticed to become, by degrees, or in fits and starts, more and more irregular. If such signs are perceived by one giving attention, and there being no rational cause outside of what is personal or peculiar to the subject, and if these signs progress in their dangerous character, then reasonable fears of mania may be justly entertained.

If care be taken at an early stage, it may be possible to detect the cause, and this is a matter of the very greatest importance, since it will not only help in the means of management, but in the prevention, cure, etc.

Legal Proceedings: A variety of forms are in vogue in different municipalities, states and countries. The simplest is for the friends to take the person as quietly as possible to a safe place for restraint, or afford safe company for protection. No person will fail to give provisional help in such a case. A more formal process can then be instituted.

A provision formerly existed in some states that gave physicians authority to give a certificate setting forth the fact of insanity, which certificate sufficed for admission,

in the regular way, to an insane asylum. But this power was abused, and has been properly revoked in a large measure.

On complaint, a commission for an arrest of an insane man can be issued by a magistrate or circuit judge.

The first step in moderate cases is a process for *restraint*. This is usually obtained by application to a physician or a magistrate. In response to an application from a wife or a husband, the physician should not proceed hastily to do what might, by chance, result in an attempt to take away the liberty of one not insane. *Hearsay* is not a sufficient ground for him to do more than to visit the case to ascertain personally the facts in the premises. He must then exercise his best skill to determine the real nature of the case, and if satisfied, from his own examination, that the person is insane, he should give a certificate to that effect, the form of which will be given below.

It is best for a physician to take a written request from either wife, husband or near friend for the examination, this being for prudential reasons. Should a mistake be made in judgment, and the person prove not to be really insane, and should it be denied that the physician was called upon, there would be a greater difficulty in defense against a possible action brought for conspiracy, if such a request could not be produced.

To admit a person, on the charge of insanity, into a hospital, two or three certificates from physicians or surgeons, not in joint business relations, and who are registered as regular authorized practitioners, or who may otherwise have proper professional authority (according as the state law may be), as also the certificate of the wife, husband or near relative, must be furnished. Such certificates must also have been given within seven days; that is, the certificates must show that the examination was thus made within this specially prescribed time.

The following is the proper form for such certificate:

"I, the undersigned, being a (duly registered) physician (or surgeon, or apothecary), and being in actual practice as such, hereby certify that I, on the — day of —, at [here state locality—street, house or other place], in the County of —, State of —, have, separate from any other medical practitioner, personally examined A. B., the person named in the accompanying statement or order, and that said A. B. is an insane person [or state more especially *lunatic*, *idiot*, etc., as the case may be], and is a proper person to be taken charge of and detained under care and treatment, and that I have formed this judgment on the following grounds, viz.: [then state the facts on which the judgment is formed in order—first, second, third, etc.], and this case being cited to me by [here state the name of the relative or person that made the call].

"Dated this — day of —, A. D. 188—.

"[Signed,] W— N—,
"No. — Tenth Street, Cincinnati, O."

Of course, the officer in charge of an asylum has some discretion as to the competency of a certificate. And it is a fact that *exception* is taken to many such; and, as it is a little mortifying to a professional person to be thus placed in default, it is proper enough here to give the most common causes of defect. They are:

1. A want in the statement of professional authority. The person should state whether he is registered, licensed or is a graduate.

2. Not naming the locality where the examination took place, nor the party's name, or place of residence, so that reference can be made.

3. Not stating the address of the insane person when at home.

It is a serious matter to send a person to an asylum—not, indeed, so much so as to send a person to the penitentiary—and it is also a damage to any person's business or professional standing to have been condemned as an insane person. And, as has been stated before, a mistaken judgment *might* subject the certifying person to prosecution, although an honest purpose will ever afford good ground for a defense against a prosecution.

MONOMANIA: The mind may be deranged, but not completely so; that is, there may be individual subjects on which the mind is perverted, while on all others it may be right. This is *monomania*, or partial insanity. The case differs from one in which there is general insanity, being in a less violent degree. So there is, in this, a difference in the words *slight* and *partial*, as applying to insanity. This presents a remarkable characteristic in the analysis of the mind, and would make it seem as if the mind had certain specific physical organs in the brain through which it acts on individual subjects, or that ideas had isolated subjective entity, and that they are persistent as species, returning into us ever in their *characteristic* forms. This appears so since the monomaniacs always have the same experience when the same ideas occupy their thoughts. Conversations may run along all right for any length of time, but the instant that the special insanity topic is mentioned the individual takes a departure and changes entirely, not only in the incoherence of his talk, but in his look and behavior. His whole consciousness is now centered on the one topic, and he is entirely insane on that one. It seems to command his whole mental power, and that power moves his whole body and characterizes every gesture. Furthermore, all his activities, thus monopolized, are quickened, and a remarkable vehemence takes place—an earnestness

of manner that shows an extreme urgency. It must be the case that great suffering is experienced by the individual when these signs of anguish appear. The condition of the mind is akin to that sometimes (and often) experienced in dreaming, when, also, there is specialty or individuality in the line of thought, and which so occupies all the thought powers as to occasion great exhaustion and distress of the entire body, with a morbid consciousness.

Monomaniacs may be very violent and require to be taken charge of, since their whole powers are brought into activity on their peculiar bent, and that with such lack of judgment that injuries may be done. What is equally remarkable is that, with the same energy and demonstrative proceeding, there may be two different keys. One may be lively and gay; the other melancholy and doleful; and in the latter, with the same excitability, fear, horror and disgust find very vehement expression.

DEMENTIA: This state of mind, although usually classed with insanity, is yet quite different in character. It should be considered in the sense that involves the *positive* and the *negative*. Insanity is the positive, and dementia the negative. Thus, in this latter, there is an absence of all thought power, and yet this differs from idiocy, for here the manner is affected by habit that formerly existed, and the movements are recognized thus as differing from those of the idiot, who never had any habit but that of an idiot. Still, in essential character, the two are, perhaps, identical, both being simply that state in which all power to project connected thought is wanting. This applies, of course, to cases of complete dementia; the disorder evinces all degrees of development, from slight lassitude to total depression.

In the first onset, while the use of language is not yet lost, there may be talking, or chattering, rather, for it is not talk; sentences may, indeed, be uttered, but these are not connected, but occur in continued repetition, and come from habit rather than from thought. In some cases, where the dementia is not complete, there are traces of thought, and for an instant, or for some moments, there may be evidence of consecutive thoughts. In mild cases there is simply incoherence of thoughts and actions. What is said amounts to nothing, and what is done is equally insignificant.

IDIOCY—IMBECILITY: Idiocy is usually a natural defect in the development of the brain. It is usually characterized not only by the absence of mind, or intellectual power, but the shape of the head at once indicates the lack of brain. It is the cerebrum, or portion of the brain that is the seat of the mental power, and not the cerebellum, or animal portion of the brain, that is lacking. The functions of organic life may be in an ordinary state of activity; the appetite and digestion may be ordinarily good, and the body may grow on from childhood to the adult or old age, while the mind of the infantile stage of life continues; there is no progress of the upper brain, or the mind.

The actions and utterances, for it is not talk, are unlike those of the one afflicted with dementia, for they are meaningless, and have never proceeded to the formation of rational habits. The entire proceedings of the idiot are peculiar. A dog, or other animal of the lower grade, will act with some appearance of method or intelligence, and show that things are understood; but the complete idiot has no understanding whatever; his is a vacant look and aimless action, that is completely automatic, if the idiocy be complete.

Now it must be understood that idiocy is not always, nor yet generally, as complete as the above description implies, and its mildest grade is exceedingly difficult to recognize from the ordinary condition of mind in some persons, so idiocy must be judged by its grade; it consists simply of absence of mind power, and is no specific ailment. In a person who shows idiocy in a moderate degree only, such person is simply called *weak-minded*; he is not an idiot.

Even the complete idiot may, like a parrot, learn articulation, but with still less resemblance to method or intelligence; for the parrot may get his sentence complete, whereas the idiot is likely to get only a part, by habit of frequent hearing, and will repeat the sounds, but there will be no effort to complete the sentence.

The term imbecile is usually understood as implying idiocy in the less complete degree. An "*imbecile*" is a weak-minded person.

Hereditary Transmission: The question of hereditary transmission has been not a little embarrassed by the prohibition of canvassing family descent for proof of such fact. Even in courts where persons were on trial for murder, it has been barred to traverse family descent to prove its heredity. But the idea of injustice to others is now somewhat abandoned, and the courts will allow proofs of hereditary descent of insanity, and the result of this has been that such fact is established. The cases of *Smith v. Kramer*, in Pennsylvania; *Baxter v. Abbott*, in Massachusetts; *State v. Windsor*, in Delaware; *State v. Christmas*, North Carolina, have made a precedent in this country, and it appears that Parliament has regulated it for England, so now there is no trouble about bringing in such testimony. Medical men become the witnesses for tests of insanity, and non-professional answer for matters of *fact*.

FEIGNED INSANITY: It is becoming now, more than ever before, a very common thing for pleas of insanity to be set up in defense where persons are on trial for criminal offenses. In the chivalric ages persons would rather die than live and be reputed insane, or to eke out a dishonored life by constant efforts to sustain a disguise. But now it is quite different. Physiological science has been brought to a *new departure*, and the new ethics recognize just two states of the mind and of the morals—the right and the wrong, the good and the bad. Virtue and innocence are the characteristics of the *sane* individual, and vice and guilt are only symptoms of *insanity*. The doctrine makes it that no sane man will do a bad act; no man but an insane one can commit murder. So if an individual is now arrested on a charge of such a crime and is brought to trial, he is straightway found to be insane, and so, being irresponsible, he is cleared of the charge. But, being now liable to be placed in a lunatic asylum, he can be proven to be insane only on the one topic—murder, and his case is to be put with those that are of the curable kind, and so he must be tenderly cared for until he gets cured, which may take one year, possibly two. Such are some of the innocent (?) follies of *some* modern scientists.

The medical expert has a sacred duty resting on him to do what is in his power to place crime in its proper light. Nihilism is becoming rampant; a division of property is demanded; the accumulations of honest toil and the savings of prudent economy are to be pooled and a general distribution demanded. How long will it be until another division will be required—when the indolent and vicious spendthrifts will have exhausted their share? Merit and fitness is no longer to be a condition precedent for office; office is a *common* inheritance to be taken by those who list, and if a Lincoln or Gar-

field chances to get into a coveted place, or should interpose questions of fitness for office into the way of the covetous aspirant, then they "must be taken away;" the *improved patterns of the pistol* are brought into requisition.

The two liberal professions of law and medicine must come to the rescue of jeopardized civilization, and stay the tide of anarchy.

Detection: Now here comes a grand arena for the medical expert. "There is method in madness," so it is said, and that method is now to be analyzed when simulated by the imposter.

Perhaps there may be no point worthy of as much consideration by the medical expert as that by which the method of the *imposter* and that of the *actually insane* person may be discriminated. To effect this it is, in the first place, most important to know, and constantly hold in mind, that the insane person has all his methods and contrivances put in order for *one* specific end, whatever this may be. Especially is this the case with the monomaniac, but it is certainly so, too, in the case of the generally insane individual. Stealthiness and expertness are the constant characteristics of the insane person who has his plans.

If the case is not a monomaniac, then the plan may not be a fixed one, and a thousand caprices may come into the way; yet, whenever that one idea comes into the mind, it is emphasized; it makes a start and jostle in the whole frame. If the thread of this purpose can be found, then the means of test can be made easy. But how is it with the one that *feigns* insanity? It is this, that the one thing so carefully kept, or so adroitly managed, is what may be known at once; it is that the *insanity must constantly be simulated*, and, by close observation, this purpose of constant simulation can be clearly de-

tected. The really insane man does not try to appear insane, but exactly the reverse. He is likely to regard all his attendants as insane, and he alone a sane individual. The fraud makes no effort of a persistent character to defend his *sanity*, but he intends to be accredited with *insanity*.

Thus the methods of the two are different. But it requires constant vigilance, after all, to make the detection. No one incident is likely to afford any strong clew. A series of notings may make cumulative proof, but it will need to be a long series. Still, this is the proper course to pursue.

The feigning individual will always exhibit his insane tricks best when he is watched; when he thinks he is not observed, he will slacken his disguise. He will be more regular in according to nature her demands; he is more apt to sleep regularly—at least, he is more naturally disposed to sleep than the really insane man. When he sustains a continued racket for a time and grows weary, sleep will betray him, for he will not easily keep it off. The really crazy man seldom sleeps; if he does, it is in fits and starts. But the feigning man will be unconscious of his soundness of sleep, and so protract it.

SPECIFIC MONOMANIA.

In a foregoing section monomania was treated of in its general character as such—that is, a mania on a single subject, and when that subject may have no specific character, and which may have no relation with natural propensities, such as stealing, arson, murder, etc. But as there are such cases as the latter, and as they are of very considerable consequence and of frequent occurrence, it is well to give them special attention.

KLEPTOMANIA—*Thieving Mania*: In some persons there is manifest a seemingly uncontrollable disposition to steal; and this is often proven to be without the usual motive of gain by it. There is, however, the necessary concomitant—secretiveness, or the hiding purpose. Numerous examples of persons who are prone to steal without the usual purpose of gain, but rather simply to *procure*, are found in some people who are disposed to pick up everything, whether of immediate importance or not. Thus such persons have been found to have repositories of stolen articles that comprise an endlessly varied character, such as old pieces of iron, brass, pieces of harness, old tools, clothes, and, very frequently, many things that are entirely worthless.

Such a person could never expect to make use or gain of such objects of theft, except simply their accumulation. Nor is the accumulation the principal object of the indulgence, as it is not found that such persons hover about their collections, like the miser, who so loves to repeatedly count his money. The indulgence is the *taking* and the *secreting*, rather than the treasuring.

What is remarkable, also, is that this class of mania is not the characteristic of the ignorant, the poor, and the needy, but is found among the educated, cultured and wealthy. An instance occurs to the memory of the author of a wealthy elderly lady who died in her house, that she had always kept closely locked, and who would never allow it to be occupied by any other parties out of her sight. After her death it was discovered that in the garret of her house there was an endless variety of *odds and ends*, trumpery that none else would care for, and which, although taken from every one in her settlement, were of such worthlessness that scarcely a single person could recognize any article, nor bear memory of ever having lost any of them. Shop-lifting, by persons of all

classes of people, has been one of the wonders of our time. There is no explanation of it but the concession that kleptomania is a special sort of insanity.

PYROMANIA—*Craze for Destructiveness*: Within one week of this writing (August, 1884), the newspapers gave an account of two instances of arson by a rather young man who had been just released, a few days before, from his second term in the penitentiary on conviction for the same crime. When arrested and brought to a preliminary trial he was led to a confession of his crime, and to a question as to his motive he answered: "*I do love to see big fires.*"

This variety of insanity is very irregular in its degrees, and has its out-crops mostly in a remarkable disposition in young boys to be destructive in almost every way. With such persons a large show window offers a great temptation for a "smash-up." Not long since the author had delivered on his premises a large lot of nicely dressed flag-stones, that were designed for a new walk. They were for the time deposited (a portion of them) on the edge of a gutter, leaning against a tree, and, observing that they could easily be tilted over and so endangered to risk of breakage, he at first resolved to have them changed; but, intending to have them laid in place very shortly, concluded the risk of one or two days not equal to the trouble of the change, and so let them remain. That very night they were precipitated into the gutter and broken into worthless fragments. A shout of laughter by several young men, the instant the slabs had fallen, indicated the facts of the case.

A vagabond soldier (?), returned from the late civil war, was relating, in the hearing of the author, his exploits in destroying the homes of the enemy when residences were captured, and spoke of one house that was unusually

fine and superbly furnished. This place was destroyed, as stated, with extra relish by him, and when all was destroyed but one great mirror against a wall he ran with the butt of his gun extended, and thus broke it "*into a thousand splinters.*" His peculiar laugh while telling this evinced his relish of destruction.

EROTOMANIA: This is not lasciviousness or prominently developed venereal propensity, but a real craziness in such propensity. It is correspondent to nymphomania in females. When the case amounts to simply excessive propensity, though brutish as it may often be, it still is not of the character to be recognized here. Erotomania is dependent on a morbid or peculiarly conditioned animal brain, brought on by excessive incitement. This in all probability is promoted by a predisposing condition of the sexual organs.

Detection: The main points for detection are to be found in the greater *vehemency* of the erotomaniac, who is reckless in consequence thereof, and has little care for results, only so that his vehement desires be gratified. In a word, he is *beast-like*; divested, as it appears, of every moral sentiment, and reckless of the opinions and respect of others, he is utterly fearless of the consequences of conviction. But it is a matter of small consequence whether a medical witness can or can not discriminate as to the matter of *insanity* in such a case, since a court will never fail to convict the criminal of rape instead of felony when the evidence of fact is complete. The moral sense will not allow of sentence to an asylum instead of a penitentiary.

PUERPERAL MANIA: The peculiar sympathy sustained by the uterus with the brain has been the subject of remark from the early ages of medicine to the present. Hys-

teria is one of the nervous derangements dependent upon the uterus. Nymphomania is perhaps not so, although it has been conjectured to be by a few. This latter singular ailment is rather dependent on a preternatural irritability of the nymphæ, and has little affinity with the uterus.

Puerperal mania is liable to come on about the third day after parturition, and thence on to about the fourteenth day, or perhaps even later. Of ninety-two cases, Sir J. Simpson recorded twenty-one occurring as late as between the fifth and fifteenth days, and the balance at an earlier period. It usually comes on during the lochial discharge, and at the beginning of lactation.

Symptoms: The symptoms of this variety of mania are not, in the main, much different from those attendant on other forms of insanity, except in one or two particulars. One notable one is a strong tendency or disposition to commit murder on her offspring. This is evinced under various fancies and imaginations. Sometimes she thinks the child is a brute, and that it ought to be killed; others have the notion that it is a monster, or that it is some ominous sign of evil, and so there is a desire to make away with it.

Ofttimes there are only mild symptoms, such as silliness, laughing, sporting and childishness, or, perhaps, rough and obscene talk. A persistent impression sometimes exists of forcible confinement, and thus constant endeavors are made to get out of bed, and the patient struggles to disengage herself from fancied bondage or tyings. She may fancy that spies are about to capture her, or that poison or entrapments are put in her way, or that all about her have turned enemies or tyrants. The belief that nothing is ailing, and she ought to get up and be about her employment, and various similar fancies, may cause a constant excitement that will continue for hours, or for a day or two; and then intervals of relief, of

more or less extent, follow, when another spell may set in, or recovery to rationality come on gradually. Some cases are of quite a different type. They are of the melancholy order, and the patient is extremely depressed and despondent. A desire to die is very common.

Occasionally, but rarely, similar symptoms as those of puerperal mania appear during pregnancy. It is then called *lypemia*. But such cases are not serious, and will wear off in a reasonably short time. The characteristics of lypemia are mostly morbid fancies, strange notions and caprices, sometimes so violent, however, as to require restraint.

DIPSOMANIA—*Delirium Tremens*: This species of mania is the most common, and is so familiarly known that surely no description need be given of it here. The legal questions that come up concerning acts that are committed in drunken delirium and fury of intoxication are of great interest to the jurist. In the earlier days of forensic medicine, *irresponsibility* was conceded. Then, afterward, intoxication was reckoned as among *extenuating circumstances*. But now the drunken man is held, and properly so, *responsible for all his acts*. The statutes so enacted are put upon moral grounds, for there can be no question as to the fact of the obliteration of the sense of right and wrong. The medical expert would doubtless put the case in that way. Hence, at this age, the medical expert is not needed, except for one purpose, which is to distinguish the cases of *common mania* from *dipsomania*; or, rather, the latter from all other kinds of mania. No responsibility goes with any but the latter; and this responsibility is not coupled with the scenes of the intoxication, but goes back to the taking of the intoxicants. This is the moral ground. Nevertheless, the judgment is always incidental to the results. Thus, if one takes unlawfully any intoxi-

cant, he is not arrested on a criminal warrant, unless another crime is committed.

If the moral element were not comprised in the statutory enactments concerning crimes committed while in a state of drunkenness, then it would be universally the practice for those of murderous intent to proceed first to become intoxicated and then go on to commit the murder, in order that the defense that drunkenness would afford might be secured.

A homicide or murder committed in a state of drunkenness has thus the full penalty of these crimes severally, even though it may be evident that no purpose of the crimes had been entertained during the antecedent sober state; proof of afore-thought during drunkenness is sufficient. Yet the laws fail to reach crimes resulting indirectly. The drinking man will, in course of time (and sometimes, alas, quite soon), destroy his mind, and insanity of the *common* type will follow. If a crime is committed when the person is *thus* insane, he is not made responsible in law. Nor yet is he responsible, while thus insane, if he should get drunk, and, in the drunkenness, commit crime.

ACCIDENTAL MENTAL DEFICIENCY: The new criminal code has certain general provisions in regard to responsibility for criminal acts that require notice, and which may as well be now considered.

Persons may lack mental power to such an extent as to exempt them from liability in criminal acts, when they are not really insane, in a pronounced degree: thus, by sickness, by noxious drugs, casual delirium, accidental intoxication (enforced), and accidental alienation of mind. For intelligent proceedings in such cases the following principles may be laid down: *First*, to be responsible, one must know the nature of his act. *Second*,

when one is *incapacitated* for knowing that an act is wrong, he is not responsible. *Third*, ignorance of the existence of law touching unlawful acts, as in cases of very recent enactments, or speedy entrance into strange jurisdiction, will not excuse one; the law presumes that all should know their duty, though some courts have allowed some extenuation.

HOMICIDAL INSANITY.

Of late years the plea of insanity, as already stated, is made a powerful defense in prosecutions for murder and manslaughter. Hence, scarcely another point of equal importance comes up for careful consideration.

Crime attaches to the existence of *intention, will, malice*. Insanity is regarded as precluding these. Largely, therefore, the case involves simply questions of fact. But yet the scientific medical man may be of important service in determining the degree of insanity, or how far the accused may be responsible.

The plea may be made, in defense, against conviction for any degree of crime, but is seldom set up in minor cases, as the accused prefers to run the risk of the penalty rather than being passed upon as a fool, or as insane, and thus be liable to confinement to an asylum. Thus, in England, in the case of the *Queen v. Reynolds* (Bodmin Autumn Assizes, 1843), the judge said that the plea set up was of no benefit to the prisoner, for, if sustained, then the penalty would be imprisonment for life, whereas, if felony or manslaughter were proven, a much lighter penalty might be enforced by the law. The plea was withdrawn, a verdict of *guilty* of felony found, and the prisoner sentenced to eighteen months' imprisonment.

Society is greatly exposed to danger by the late almost universal plea of insanity in trials for murder. When

such pleas are sustained, the prisoner is placed in an asylum and put under kind treatment in view of a "*cure*." In the generality of cases the *cure* is speedily effected, and the "*patient*" is *discharged*, and so is ready for his next act.

But that there are real cases of *homicidal insanity*, there is no doubt—at least, so we find by the records of the criminal courts; and the services of the medical profession in such cases are of great importance.

It was but recently that a young boy in Massachusetts was on trial for homicide. He had, from his childhood, evinced a murderous disposition, and readily owned to a *love to see blood*, and to kill animals. Still another similar case was noticed in the newspapers that occurred in some Western state. It is wonderful what brutality, coupled with a love for killing, there is found in some persons, though, happily, rarely. It has been supposed that certain employments dispose persons to insanity of this type, such as those of the butcher and army surgeon, and the histories of cases do seem to make this appear so. It thus becomes a nice question to know how much must be allowed in extenuation. It is doubtful whether on such a plea as a cause of homicidal insanity the services of the medical man are of any more value than those of others, in common cases.

A jurist or witness in this variety of insanity must carefully analyze the mental constitution, and discriminate as to the question of motive, the nature of the provocation in the case in hand, the character of responses to other provocations (if such may have occurred), the conduct evinced toward children, females and defenseless individuals; above all, the *behavior* of the prisoner is to be carefully studied. Efforts to simulate are surest when observed; when unobserved, then a change may be discovered, if feigned.

LIFE INSURANCE.

CHAPTER XXVI.

LITIGATIONS on matters of life insurance are more common in England than in America, but are sufficiently so in this country to make it desirable for medical men to be able to give competent testimony. On the other hand, the lawyer is not competent for his labors unless he has thoroughly informed himself on the bearings of law to equito-medical jurisprudence.

For the services of the medical man there are questions of concealed or undiscovered diseases that affect insurance policies, and other causes of death in which there are bearings that concern policies, where the medical expert may be of service. In equity, as well as in criminal courts, the physician finds his services as a professional man only in matters that appertain to his skill, science, experience and judgment. They do not concern matters of simple *facts*. With such he is on a par simply with the non-professional man.

There is one feature in life insurance that involves a *moral* wrong, but which escapes the recognition of law. For this no service can be rendered in this work except for making sentiment. It is that relating to the "*mean expectation*," as it is called—that is, the mean life term—which is highly underrated by insurance companies, and great profits come from this source. A man reading what is published in papers, pamphlets or bills makes up his mind on the facts, or *alleged facts*, as to his chances, as thus published. His inducements come from the

allegations made, and he is thus wronged. In the first place, the natural death rates are too great; and in the next place, the policies are only issued to persons who are of *sound health*. Now, if the death rates were calculated on the lives of *sound persons* only, instead, as is done, on the whole population, the death rate would be *considerably less*.

PRESUMPTION OF DEATH: To recover on a policy, the event of death must be proven; this ordinarily is easily done, but it sometimes happens that the proofs of the event are not accessible. Persons may disappear, and there may be circumstances that are strongly indicative of death, as portions of garments in the place where last employed, especially such as a hat, coat or vest, or there may be signs of blood, or disturbance of furniture, tools, etc.—all of which are regarded as strong circumstantial evidence. Then, again, a person may have left home with a horse or carriage, and disappear, while the horse or carriage may be found; or one may have set off in possession of considerable money, who could not be suspected of fraud, and afterward be missing. In such cases there is no evidence except such only of *facts*. No professional service is required. Such circumstantial evidence is required to be very strong to make a case.

If the absence is of long duration, there is a provision of *presumptive death*, as it is called, that dates at seven years from time of absence, if the circumstances are such as to afford corroboration.

Going to sea lessens the time for presumptive death. In such a case there must be proof of departure and intended destination of the vessel sailed upon. If such vessel is not afterward heard from, in a reasonable time, there is then *presumptive death*.

After seven years, in *presumptive death*, the burden of proof rests upon the defendant, or party that issued the policy. If that party can not give proof of signs of life of some kind, in tangible form, the defense can not be sustained.

CONCEALED DISEASES—FRAUD: It is this that brings the services of the medical man mostly into use in life insurance. When a policy is issued on the supposition of the absence of diseases, and if there were known diseases present, then the policy is vitiated thereby.

All decisions have not been in accord in this matter. When death occurred from other causes in persons under ailment, the policy having been issued on the supposition of soundness had, in some cases, worked no damage to its validity, as decided in some courts. Others have been adjudged as vitiated because fraud was disclosed as having been practiced by the assured, even where it appeared that the ailments present at the time of issue had no part in the cause of death.

Another point has appeared in this variety of decisions, and this is, that there is a large proportion of the community that have ailments—persons who usually consider themselves in health—and so there is really a difficulty in determining the question of soundness; hence, the matter of fraud can have no certain means of proof. A court thus finds it a difficult matter to look into the mind of an assured party and ascertain whether he had fraudulent intent or not when the policy was taken; therefore, it became a ruling that the after discovery of previously existing disease shall not be considered as presumptive evidence of fraudulent intention. Unless the previously existing ailment can be shown to have been a factor in the immediate cause of death, it does not vitiate the policy.

The correctness of the principle here mentioned is evident, when it is considered how few persons there are who, though reputed in ordinary good health, at times have some transient symptoms of dyspepsia, distress at the stomach, flatulency, headache and occasional want of appetite. Also, in regard to rheumatism: how few there are who are entirely free from transient pain of a limb or other part on occasions of change of weather, though they may be vigorous, doing full employment, having good appetite and ample rest in sleep. Such persons are ever in the habit of regarding themselves as in health, and it is only the spleen and the fanatical that are always complaining.

It is right here that the services of the medical man are of the greatest importance in matters of life insurance—not to determine whether the assured practiced deception, but to ascertain how far a last sickness, or the immediate cause of death, had been affected or promoted by ailments existing at the time of the issue of the policy, when such is proven to have had existence.

As to employments, life habits and exposures, there are usually written or printed provisions or stipulations in the policies. When such exist, the practice of what is forbidden will work damage, unless a special permit has been given. Where there are no such stipulations, there are no risks of damage to the policy, though a greater exposure may have been practiced than is common.

Exceptional Diseases: There is a difference in the hazard of diseases, as held in reference to life insurance, and the medical man will need to bear the list in mind, so as to be ready in testimony as to comparative risk. Among these are diseases of the heart, affections of the lungs and throat, apoplexy, epilepsy, palsy: diseases of the brain, bowels, kidneys, liver; insanity, rheumatism, gout, and particularly phthisis pulmonalis. Many policies have,

among the names of restricted diseases, the word "*fits*," which is unprofessional in the medical ear, but still has an antiquated meaning of spasmodic or convulsive diseases, implying mostly epilepsy; and yet, in the same policies, epilepsy may be otherwise specifically named.

SUICIDE: Suicide is usually a specified, exceptional or prohibitory incident to collection on policies; and, as some means of suicide are obscure as to the cause or motive leading to the manner of death, it is well for the medical man to be informed as to the means of determining the same. Perhaps there is nothing that allows of so much doubt with the professional man as the questions concerning sudden deaths when there are no outward signs, and when the dead body can not be dissected.

BIRTH—INHERITANCE.

CHAPTER XXVII.

MEDICAL evidence is less demanded in the United States than in England as to matters and circumstances of birth, in so far as inheritance is concerned. Matters of titles and entailments are not here, as there, closely observed, as being dependent on circumstances of birth. Here the main question in this regard is that of *live birth*, which determines the direction of inheritance.

To be ever best prepared in all questions as to time and particulars of births, it is well for physicians to keep a professional diary or case-book for entries. In this way many a vexatious case may be settled by a knowledge of dates, etc., that are thus accessible.

A child born alive, or that is completely brought forth in a living state, will, by English law, inherit and transmit property to heirs in its line, even if its death should ensue very shortly thereafter. If the child be born dead, or even dies in birth, no such heirship or transmission follows. In regard to partial birth in living state, there is a fiction instituted to avoid the casuistical questions that would come up as to how much of birth is required for an inheritance. Therefore, the fiction of death is instituted for all such children as do not give the functions of life after entire separation from the mother. The instant of the cutting of the umbilical cord—when, as is common, the placenta is an “*after-birth*”—has great importance attached to it. Thus, if a child cries and breathes during delivery, and ceases to be able to do so when com-

pletely delivered, or to give other independent life signs, it is pronounced *dead-born*. If it cries and breathes, or does either, after it is separated from the mother, it is a *live birth*. These facts are, however, only to be taken as *prima facie*, because a case may still be proven to be a live birth by professional evidence. There may be causes of obstruction to breathing and also to crying, and the child, nevertheless, be really living. These cases bring in specialties to the statements above; and here is where professional skill and judgment are very valuable. Thus the detection of the action of the heart after complete birth is sufficient, or, in an English court, the movement of a limb or muscle, known to a professional eye to be dependent on life in the child, will suffice. Nor is the duration of such motion of any significance, as a single spontaneous and instantaneous jerk or motion makes the case. This has a technical sense, called life *a fortiori*.

A very interesting case is on record in an English court, that shows the nicety to which the evidence in such a case may be brought, and how delicate may be the points. In the case of *Fish v. Palmer*, which occurred in the Exchequer Court in 1806, the wife of the plaintiff was possessed of landed estate in her own right. She had died in 1796, after having given birth to a child, then supposed to have been born dead. Because the plaintiff did not have a living child, as it was supposed, during his marriage with this wife, the real estate in her right passed to her next heir-at-law, Palmer. From information derived (ten years after the death of his wife) from some women who had been present at the delivery of the said child, the plaintiff (Fish) was led to the belief that it was not dead-born, and hence he brought suit against Palmer for the recovery of the estate. Dr. Lyon, the accoucheur, as appears by the testimony, was then dead; but it was proven that at the delivery he had made efforts for the

restoration of life, and proof was made, also, that he had declared the child to have been alive an hour before birth. The efforts for restoration were the use of a warm bath. Dr. Lyon had given the child, after its birth, to a nurse to be placed in a warm bath. The child, which had neither cried, breathed nor moved after its birth, and before its being placed in the bath, was yet noticed by two women handling it in the bath to evince a *twitching or tremulous motion of its lips*. The women spoke of this to Dr. Lyon, and he directed them to blow into its throat; but no further sign of life was observed.

Expert testimony of high standing was then given in the case. Drs. Babington and Haighton, who were called by the plaintiff, testified that if the child had been born dead, and the vital principle extinct, there could not have been any muscular motion of the lips. On the other side, Dr. Denman testified that two principles as to the source of life must be recognized—the one uterine, the other that of the child—and stated that the uterine life might have extended persistent signs of life to the child, which would manifest itself in the delivered child. The jury, however, under the direction of the court, brought in a verdict for the plaintiff, pronouncing the child to have been born alive. Dr. Denman had, however, so worded his testimony, as considered by the judge and jury, as not to be in conflict with the evidence given by the other two eminent men. He did not say that the child was dead-born, but that it was live-born only by the derived persistent uterine life. The estate was accordingly transferred.

If this case be regarded as affording a weak precedent because a jury made the decision, additional testimony may be given; for, although it has been held that crying and breathing are the only reliable evidences of live birth, yet the high authority of Blackstone goes even further. He

says ("Commentaries," Vol. 2, chap. 8): "Crying, indeed, is the strongest evidence, but it is not the only evidence." Coke says: "If it be born alive, it is sufficient, though it be not heard to cry; for, peradventure, it may be dumb." He states that "motion, stirring and the like" is proof of a child having been born alive. This sustains the court and jury decision in the case of *Fish v. Palmer*. The facts are that the English laws differ in different parts of the realm. In Scotland, both breathing and crying are required for proof of live birth, while in the British Isle motion alone suffices. The Scotch are captious; they require not only a *living*, but a *crying*, child for heirship. The French laws incline to the Scotch, and the American to the English, in decisions.

Tenancy by Courtesy: This is a legal term, which had its origin in the English law, but also enters into our practice. It provides that if a wife possess an estate and dies without issue, then the estate goes to her heirs-at-law. If a child be born dead, the estate takes the same course. If born after the death of the mother—that is, if the child be extracted alive, either per vagina or by the Caesarean operation, it is still the same as dead-born, though it live after the extraction. If born during the life of the mother, and there be only signs of life in the child, it affords tenancy by courtesy. All live births afford it.

This capricious or nonsensical law, which makes circumstances attending birth, as thus related, involve those hardships, has caused endeavors to be made for remedying it; but it has not come to the knowledge of the author whether the remedy has been secured in any state. The endeavor has been to make the fact of legal marriage afford tenancy by courtesy, because the hardship not only comes alone by the accidents that attend the birth, but they are also controlled by the condition of the wife as to

the *capability* of bringing forth a live child. She may be barren or deformed, so that a child will be taken away only by craniotomy or in sections, which circumstances are not only *not* the fault of the husband, but they *augment* his distress.

Tenancy by courtesy gives the husband the use of the wife's property during his life, but it does not descend to his line of heirs.

CIVIL RESPONSIBILITY.

CHAPTER XXVIII.

THERE are a variety of topics that come under this caption of "Civil Responsibility," which are best treated under divided discussions. They concern capacity for giving testimony, making wills, contracts and marriage engagements; also, the matters of liability to parents, guardians and state and municipal laws.

MARRIAGE, MENTAL COMPETENCY FOR: The laws forbid the marriage of *insane* persons, *idiots* and *children*, ordinarily. The marriage of a lunatic is a nullity *ab initio*; yet a discovery of the existence of insanity at the time of the marriage contract will not ordinarily admit of spontaneous separation; but, for making the separation lawful, regular proceedings are necessary for divorce before a competent court. Medical, or expert evidence, is best in the case.

Responsibility of the estate of a lunatic for necessities of his wife or family is usually conceded.

Marriage of deformed persons is voidable, but not illegal.

Marriage of same sex is voidable and illegal.

Marriage of Children: While there may not be found statutory prohibitions, such marriages are voidable; but there is much difference in the laws of the different states and nations in the regulations bearing on this matter, and, as the subject is not strictly one of Medical Jurisprudence, the reader is referred to the civil laws.

LUNATICS AS WITNESSES.

There has been some fluctuation in regard to the question of the competency of a crazy man to give evidence in court. The difficulty has arisen chiefly, not as to the competency of one in a state of obvious mental derangement, but because a person, pronounced as insane, frequently has sane intervals; and, on matters that occurred during a former sane state, or in a present sane state, he has, when rational, seemed to be capable of giving reliable evidence. Hence, no rigid rule of law could be well constructed. At this time such testimony is admitted under oath, when, on the examination of a court, the case is favorable. The testimony can then be weighed for its worth. It may be valuable as corroborative testimony, at any rate.

CONTRACTS BY LUNATICS.

While an individual making a contract with another who may be proven to be insane, or in a mental condition of such character as to unfit him to do business safely to himself and family, may not be able to take advantage by repudiation, yet the other, or any of his family, or the next of kin, may annul such contract by evidence.

INTERDICTION FOR INCOMPETENCY.

By interdiction is meant, in law, the arrest of a man from the control of his property or estate when he is incapacitated for safe or judicious management thereof. To take away one's civil rights is a serious undertaking, and is only to be attempted in a proper way. On complaint of one of his family—as wife, son or daughter—or of near kin, or a person who may be a creditor, to a chancery court, there may be a commission granted to determine if the person

be *compos mentis* or *non compos mentis*. The writ called *de lunatico inquirendo* is issued. Before this can be done it is necessary, among other matters, that there should be affidavits made by two or three competent physicians or surgeons, certifying to the insanity of such person. It must be stated specifically that the deficiency is a mental defect or disorder other than simply ordinary weakness or lack of education, or of simple bodily infirmity.

Courts should exercise great prudence in the issuing of commissions, as there may be conspiracies on foot for diverting property by fraudulent means. And another point, less easily managed, for preserving the rights of all, is the fact that there is now no law prescribing a way for the selection of physicians certifying to a court, preventing the service of such as may be interested, prejudiced or in conniving relations. The court has discretionary power, however.

A court, in determining such a case, does not simply have to decide the question whether such person may have given evidence of some unsoundness or defect of mind—whether eccentric in acts, melancholy or disposed to imbecility, or occasionally mentally deluded—but it must be proven that the person is really incapacitated to control his property or estate with safety to himself, his family or creditors.

In all such cases the jurist or examining witness will do well, when possible, to compare such person's manners and doings while so afflicted with his habits previous to such affliction, rather than with the habits of other persons.

A commission of lunacy may be superseded; but this can be done only by powerful and positive evidence of sanity or capability.

Commissions of *de lunatico inquirendo* may issue against persons endangering an estate by habitual drunkenness.

The process is the same as in the case previously stated, except that the cause of the deficiency (*intemperance*) is to be named in the certificates.

In some states, as Pennsylvania, the court applied to is the Supreme Court: but, commonly, the Common Pleas Courts have original jurisdiction.

Test of Capacity: In cases of interdiction the tests are not well defined; but, as already stated, it is not the question of a general standard of mental competency, but one of safety of property. When a person is proven to have the ability to state, consistently with values, the nature of his business, and can predict or declare postulates, he is to be accredited with the recognition of his competency to still take the care of his property.

A very interesting case of incompetency has just been affirmatively decided in Chicago in the person of Mr. Story, of the "Chicago Times," involving an estate of \$3,000,000.

DEEDS OF INCOMPETENTS.

In the matter of the conveyance of property, there is power vested in chancery courts to annul a conveyance, when such deed bears evidence of incompetency of the party making the conveyance. The case usually turns upon the notable inconsistency of the consideration with the real value. In cases of this character there is always greater ground for setting it aside, or, at least, for sustaining a suspicion, when such deed is written by the party himself, or is executed in an inordinately close way.

It is almost impossible for courts to proceed in these cases without being sufficiently influenced by moral considerations to take cognizance of the circumstances as to the relative business status of parties. Thus, a court can hardly help the outgoing of sympathy to a person reputed to be feeble-minded, when the other party is of a shrewd

business capacity. The rulings of courts must be in accordance with the law and the testimony, and will, in such a case, only lead to more careful observation and judgment.

A court will usually press closer scrutiny in the case of a property transfer by deed than is practiced in litigation or contests of wills.

WILLS—BY INCOMPETENTS.

Eccentricity: A will is not declared to be invalid if its eccentricity is in accord with a former eccentric life. Interference in such a case would assuredly be inconsistent with equity. The ground for setting aside an eccentric will must show that the eccentricity is inconsistent with the former life, habits and business usages of the individual. An eccentric man may reasonably be expected to make an eccentric will. If he should do otherwise, it would only then, in the matter of *fact*, be eccentric, although really of greater validity. The will, to be invalid, must be an abrupt departure in character from the former habits of similar proceedings, and be inconsistent with the proprieties of such matters.

The validity of a will does not depend on the soundness of the body or vigor of the intellect, but on the capacity to dispose consistently. This capacity is not to be judged by the freedom from odd conceits. A person may have his likes and dislikes, and may have acquired his property while possessed of these, and why is he not able, also, to dispose of it consistently? This is the view the courts take of the matter.

Medical men are the most competent witnesses, and those who may have attended the person have the best means of judging how far the mind may have departed from its usual character.

If a testator, though eccentric, knows the value of property, and the consequences of a reckless use of it, he is competent to dispose of it by will.

The character of diseases under which the maker of a will may labor is to be taken into account, and if it can be proven to affect the mind, as shown by an eccentricity more notable than the usual habit, and it be inconsistent with former habit, then a will may be damaged or made void.

Delusion Evinced in Deed: A person may be in such a state of debility or mental disorder as to be liable to delusion by the force of surrounding circumstances or influence of individuals, and the law takes cognizance of such fact; but simply a favoritism greater than usual does not show a lack of lawful disposing power. Persons may acquire property in such a condition, and may judiciously dispose of the same. The groundwork of a will must be delusion, if it invalidates it. The instrument usually shows for itself in such a case: It will appear that the delusion caused its construction; the wording and tenor thereof show that the mind was bent on the delusion; so the instrument is the best evidence of this particular. External evidence, as the use of conversation, and the consistency thereof, while the will was being made, affords good proof as to the question of competency.

A delusion may, however, be concealed in the midst of the circumstance of its making, just as a suicidal intent may be concealed. Proof of effort at concealment works damage.

Sir J. Nicol declared that it is not necessary in civil courts to connect the morbid imagination with the act itself. If the mind is proved to be unsound, it makes the act void.

Lord Wensleydale (*Roberts v. Kerlake*, Warwick Autumn Assizes, 1854) held that, to vitiate a will, if it be a case of

delirium, the act must be traced to delirious delusion, but, if it be a case of lunacy, it need not be traced to a delusion.

SENILE INCOMPETENCY FOR WILLS.

Dementia from old age may make one incompetent to make a valid will; but the proof of weakness of mind, even though it be considerable, is not of itself a sufficient ground for setting it aside. The character of the will must show signs of incapacity of mind to make a rational will. It is not always the case that the lack of expression in the thoughts uttered is dependent on the quality of the mind, but may depend upon a lack of power in its evolution; hence, when concentration of the mind be made, the result is likely to be different. Right here comes in the proof of incompetency. If, on concentration, the mind loses its coherency or integrity as to the subjects of thought, then it is incompetent to a corresponding degree; but if concentration, or effort to be complete, makes an improvement in the mental state, then there may be competency for the work of making a will.

Medical judgment is of service, because the physiologist can compare symptoms to advantage. In senility, it is not lunacy that is in question, but only strength of mind sufficient for rational acts. A mind may lack integrity without insanity; the latter does not essentially lack potency, for the mind may be vehement, but it lacks in quality; the one is imbecility, the other insanity. Senile imbecility is shown by the breaking off of thought, the dropping away of ideas and the lack of ability for the recovery of them, and thus a precipitation ensues, so that new subjects fall into the course.

Incoherency of thought is the characteristic of senility. If, therefore, the mind of the maker of a will is proven to have been, at the time of its formation, of such inco-

herency as not to admit of connected thought, such a one is incompetent. The degree must be judged of by experts. If the mind can propose an object, and then proceed to cherish that object, it proves integrity. But if nothing can be predicated of such object by the party, then there is incompetency.

Dr. Taylor proposes it as a good means for evidence if the witness shall apply to the testator for a repetition of the object and character of the will, in the absence of the instrument, and thus compare the statements with the latter to test the rationality of the intention.

Where a will is made, placing property in trust for future objects with a party who is to receive compensation therefor, but, in virtue of the tenure of the trust, has power to transfer or resign his responsibility, it was held (*Greenfield Estate*, 2 Harris, Penn., 489) that where the trustee is the writer of the will, it is void. This instance, however, is not one of a question of senility; but it is one that is likely to occur in a will made when the mind is weak. The case places the trust where the guaranty of integrity and execution is not provided for properly.

INTEMPERATE TESTATOR.

When at the time of the making of a will the person is proven to have been in a state of intoxication, by alcoholic drink, opium or other drug whose properties are such as derange the mind, such will may be set aside. The case turns on evidence of *fact*, but experts may be of service to judge of the value of the symptoms.

Habitual drunkenness may not be a cause for setting aside a will, for the man may be of sound mind when making the will. Sir J. Hannen, in probate court (*Smith v. Austin*), demanded of plaintiff to show that the mind had been so enfeebled by intemperance as to be incapa-

ble of exercising judgment. This was not proven, and the will was sustained.

In regard to the power of narcotics in working incapacity of mind for wills, Dr. Taylor mentions a case, once referred to him, of a man who had, during life, contracted an inveterate opium habit—to the extent of fifteen grains a day. He made a will fairly disposing of his property, but in *nine days* afterward the will was revoked and another substituted by which all of his property was bequeathed to a younger son. The inference was that the opium was the cause of this lack of consistency.

Restriction of Professional Opinion in Case of Wills: This is a point of practical importance, and it is unfortunate that court rulings are not in accord when the question involves judgment of the value of testimony produced—that is, the determining of the value of signs, or indications of competency, as afforded by testimony of others.

Lord Campbell (*Bainbrigge v. Bainbrigge*, Oxford Summer Assizes, 1850), in a case where testamentary capacity was disputed, held that a medical witness, although conversant with cases of insanity, can not be asked his opinion as to the insanity of a testator, founded upon evidence given at the trial in hearing. (See "Medical Gazette," Vol. 46, p. 240; also, Cox, "Criminal Cases," 454). This is, perhaps, exceptional ruling.

In the case of the *Duchess of Manchester* the holding was different from that of Lord Campbell, for in this the opinions of Drs. Sunderland, Mayo and Conolly were taken as to the value of the testimony produced in court on the question of the competency of the testatrix.

Dr. Taylor lays down this principle as a practical one generally sustained, that a person must be presumed to be sane and competent to make a will until the contrary is proven, and therefore the burden of proof of unsoundness rests upon the party making the impeachment.

He adds the following relative to the importance of witnesses who subscribe to a will—satisfying themselves that the testator is of sound mind: “*It is their duty to become satisfied of the sanity of the testator before they subscribe the instrument.*” And this maxim: “*Omnia præsumuntur rite et solemniter acta donec probetur in contrarium,*” is not admissible, as applied in *Wrestler v. Custer*, 10 Wright, Penn., 502. Other states than Pennsylvania have also seemed to favor it. (See *Barber v. McFerren*, 2 Casy, 214; *Rees v. Stille*, 2 Wright, 138; *Jackson v. Vandusen*, 5 Johns, 144; Vermont, *Dean v. Dean*, 1 Williams, 746; New Jersey, *Trumbull v. Gibbons*, 117; Kentucky, *Harkins v. Grimes*, 13, B. Monroe, 257; New Hampshire, *Perkins v. Perkins*, and also Alabama, Arkansas, Delaware, etc.)

Yet, on the other hand, the Crocket motto: “*Be sure you are right, then go ahead,*” as applied to parties witnessing a will, is emphasized by Sir J. Jekyll, who says: “The proof of a *will* is attended with more solemnity than that of the *deed*, the former being supposed to be made when the testator is *in extremis*; and, therefore, in equity, it is *necessary to prove the sanity*, which is all presumed in the case of the latter.” Then, as the statutes generally provide that a testator must be of *sound mind*, it is obvious that the witnesses to the *will* have great responsibility.

PERSONAL IDENTITY.

CHAPTER XXIX.

THE question of personal identity is one that often occurs in Medical Jurisprudence, and is sometimes of considerable importance. It takes in the matter of *facts*, however, most largely in many instances, and professional evidence may not often be necessary.

When inquests are held, the first, or at least one of the most certain, of the questions asked of the jury is: "Of whom is this body?" Its pertinency is most obvious. Instead of retaining the features and appearance of life, the corpse may have greatly changed, and identity may be difficult. But this may not be the greatest of the difficulties. The body may be greatly mutilated, or, perhaps, only a part thereof, as an arm, leg, or even only a fragment of bone or flesh, may be the subject of inquiry. Still, identity is to be sought. Then, again, the body of a stranger may be found and require to have its identity established. Such was the case with the late Dr. Livingstone, whose body was brought to England from another continent, changed and long dead.

An individual may be charged with a crime and disappear; years afterward, one will appear who is suspected to be the same person, so identification is sought. An individual, long absent, may return to claim property, and his identity may have to be established. A child may be kidnapped and borne away, as the late Charley Ross, and his identity be earnestly sought.

Bodies may be taken from graves, and, on the discovery

of bodies, entire or mutilated, in the possession of ghouls or in a dissecting room, may require identification.

Collisions, falls of buildings, shipwrecks, fires and other causes of death, in large or small numbers, may give many occasions for identifying bodies. Wars and tornadoes may scatter groups of bodies needing identification.

But the greatest need for service to the state and for the inquiries of criminal courts, or coroner's inquiries, is usually in cases of bodies of persons who have been murdered. And in these latter, as also in all the others, evidence of matters of fact may suffice, but very frequently the services of scientific medical men are required.

Questions of probable age, sex, stature, cause and period of death may be submitted to the medical jurist when only, sometimes, a part of the body is possessed. He must now, by his anatomical skill and advantages of his observation, give, if possible, the proofs that are to lead to the identification.

Peculiarities of a physical character in size, color, texture, or of pathological conditions of organs, may be of service. Marks, as of moles, pimples, sores, cicatrices, tattooing, teeth-filling, shape, presence or absence of teeth, color and structure of the eyes, nose, mouth, ears, etc., are to be noted. All these examinations of particulars come into the inquiries of matters of fact, and also of the learned physician.

Still, the personal identity of the living is more frequently a subject of inquiry than that of the dead, giving, as it often does, a very essential connecting link in testimony concerning the guilt or innocence of a person on trial for a crime committed early or later in the past.

Wherein, in such cases, the medical man may be of greater service than another is by his more habitual noting of personal peculiarities, especially if these are quite prominent. But, again, where defects in health or the

functions in the living may have been known, and a mutilated or partially decayed body is found, the skilled medical man may judge, sometimes, by the condition of the organs or parts remaining, and produce the proofs that are lacking to make a case. Thus a person that in life may have had asthma, phthisis, heart disease, affections of the liver, bowels, stomach, kidneys, bladder, etc., may be identified in a measure to make, at least, strong corroborating evidence, if not full proof, when taken with other facts. The body will often indicate the employment one had followed. In females it can be known whether they have borne children—sometimes, really, the number of births or abortions—whether they are virgins, or likely to have been married, etc. Even fragments of clothing, hair, contents of pockets, jewelry, etc., have proved, with corroborating facts, to be of great value in evidence.

AGE—Matter of Fact Evidence: The practiced eye will usually enable one to judge closely of the age, and so help an identification. Persons in growth define their age pretty well in their features; old age is readily distinguished, and middle age only is more difficult. Hard labor, exposure and sickness effect changes, but these, instead of obstructing, may help identification. The hair is not only indicative somewhat of race, but indicates age moderately well. In the child, it is generally flaxen; in youth, clear, glossy and full; in an advanced adult, it may be dark brown, red or of other shades, but has stray hairs, thinly scattered, of white; in approach to fifty, it is usually gray, and after sixty to old age it is progressively white. Baldness comes as a fact, also, into evidence many times, and its extent and character are to be noted. These facts do not, indeed, give new information to the reader, and are given only as notings of what a witness should carry in memory, or in memorandum entry.

AGE—*Professional Evidence*: The anatomist can tell the age pretty nearly up to the period of seventy-five by the stages of ossification in the bony structure.

At one year of age the ossification points are noted in the lower extremities of the humerus and ulna; the heads of the femur and humerus; the upper cartilages of the tibia.

At one and a half year the anterior fontanels should be closed.

At two years the ossification points are at the lower cartilages of the radius, tibia and fibula.

At two and a half years the points of ossification are at the greater tuberosity of the head of the humerus, the patella and the lower ends of the last four metacarpals.

At three years the ossification points are the trochanters.

At four years they are the second and third cuneiform bones of the tarsus.

At four and a half years the ossification of the small tuberosity of the head of the humerus and the upper cartilages of the fibula occur.

At six years the descending ramus of the pubis meets the ascending ramus of the ischium.

At from eight to ten years the upper cartilage of the radius becomes ossified.

At nine years the ilium, ischium and pubis meet in the cotyloid cavity (acetabulum) to form the pelvis.

At ten years ossification begins in the cartilaginous end of the olecranon.

At twelve years the ossification point is the pisiform bones of the carpus.

At thirteen years the three portions of the os innominata (ilium, ischium and pubis) which now, being nearly united, can still be separated. The neck of the femur is ossified.

At fourteen years, or age of puberty, there will be found some fourteen additional centers to the sacrum.

At fifteen years the coracoid process becomes united to the scapula.

At fifteen to sixteen years the olecranon becomes united to the ulna.

From eighteen to twenty years the epiphysis at the upper end of the thigh bone is joined to the body of the bone, as well as those belonging to the metacarpus, metatarsus and phalanges.

At twenty years the upper and lower epiphyses of the fibula, as well as the lower epiphysis of the femur, are respectively united to the bones.

At twenty-five years the epiphyses of the sternal end of the clavicle and of the crista ilii are united to the bones.

The adult age is known by the union of all the epiphyses to their respective bones (except the vertebræ), and the bones themselves are compact and show well the muscular attachment rugas, as also their processes and foramina. At this age, also, the wisdom, or back molar, teeth show themselves.

At thirty years the epiphyses of the vertebræ are united to the bodies of the bones, although this may be so at an earlier age.

About the thirty-fifth to fortieth year the second and third portions of the sternum are united to each other.

At about fifty years the first and second pieces of the sternum will generally be united to each other, although this is sometimes slower in completion.

At sixty the cartilages of the larynx are likely to have assumed an ossified texture, more or less.

In old age, as at seventy, the cartilages of the ribs may be ossified, though this is not always so. The first pair ossify earliest.

At still older age the large vessels about the heart may be ossified.

In extreme old age the diploe of the skull is absorbed, and the skull is thinner than in the middle time of life.

Such is the benefit medical science brings to the service of jurisprudence in this one part of the anatomical structure—the bones.

But this is not all, for it goes back to embryology and determines the age of the new being from the embryo up through the development of the fœtus to the very birth of the child, so that there is a complete index of the ages from conception till the form returns to the elements again after death. The following table defines the periods of development :

TABLE DEFINING THE PERIODS OF DEVELOPMENT.

AGE.	TOTAL LENGTH.	TRUNK.	UPPER EXTREMITIES.	LOWER EXTREMITIES.
20 days (chorion filled with fluids).....	Ovum visible as an oblong point.	No differentiation of parts.	None.	None.
30 days (fœtus).....	Worm-like embryo, 3 to 5 lines in length.	Head and trunk.	None.	None.
40 days.....	16 lines.	1 inch.	5 lines.	4 lines.
2½ months.....	2½ inches.	1½ inch.	9 lines.	7 lines.
3 months.....	3 inches.	2 inches, 1 line.	13 lines.	11 lines.
4 months.....	4 inches, 4½ lines.	2 inches, 11 lines.	1 inch, 9 lines.	1 inch, 5½ lines.
5 months.....	6½ inches.	4 inches, 4 lines.	2 inches, 6 lines.	2 inches, 2 lines.
6 months.....	9 inches.	5 inches, 8 lines.	3 inches, 7 lines.	3 inches, 4 lines.
7 months.....	1 foot.	6 inches, 5 lines.	5 inches, 10 lines.	5 inches, 9 lines.
8 months.....	1 foot, 2 inches.	8 inches, 3½ lines.	6 inches, 8 lines.	6 inches, 6 lines.
9 months.....	1 foot, 6 inches.	10 inches.	8 inches.	8 inches.
1 year (3 months' child)...	22½ inches.	13 inches, 6 lines.	9 inches.	9 inches.
3 years (2½ years' child)...	2 feet, 9 inches.	19 inches.	14 inches.	14 inches.
10 years.....	3 feet, 8½ inches.	2 feet.	19 inches.	20 inches.
14 years.....	4 feet, 7 inches.	2 feet, 4 inches.	24½ inches.	27 inches.
25 years.....	5 feet, 4 to 10 inches.	2 feet, 8 to 10 inch.	31 inches.	33 inches.

The above is the measurement of the English. Americans exceed it.

The following is the average weight of children from birth to one year of age :

AGE.	LBS.	OZ.	AGE.	LBS.	OZ.
At birth.....	6	8	7 months old....	13	4
1 month old..	7	4	8 months old....	14	4
2 months old.....	8	4	9 months old....	15	8
3 months old.....	9	6	10 months old....	16	8
4 months old.....	10	8	11 months old....	17	8
5 months old.....	11	8	12 months old....	18	8
6 months old	12	4	.....	....	....

This is the average weight of English children, but it is conceded that in this country the children are larger and heavier. Males are slightly heavier than females.

For the first twelve years male and female children progress very nearly alike in weight year by year. Afterward the male exceeds in size and weight.

COMPARISON OF SEX STRUCTURE.

Professional evidence requires a knowledge of the difference in structure of males and females, so as to afford means of settling identity. The following will show the main differences thus to be noted: (1) In general, males are larger and heavier than females; (2) males have broader and more square shoulders than females, also larger thorax. Females have proportionately wider hips and more capacious pelvis. The female pelvis is not so deep as that of the male, but exceeds it in all lateral dimensions. The bones of the female pelvis are proportionately lighter, the ala of the ossa innominata are wider in spread, and the antero-superior spinous processes, and the tuberosities of the ischia and of the acetabula, being further away from the medial line, give to the female a

greater prominence of the hips. The sacrum is wider and less curved, and, consequently, the angle it bears with the vertebral column is less prominent than in the male. The thyroid (obturator) foramen is rather triangular in form, and of smaller size than in the male. The ischiatic spines project less into the pelvic cavity, the coccyx is more movable, and the pubis is less deep. Thus the passage through the pelvis is in every way more direct and wider than in the male, but not so deep. When compared as a whole, it is more basin-like, while that of the male is more box-like. The following table gives the various measurements of the male and female pelvis in inches and lines:

MEASUREMENTS OF MALE AND FEMALE PELVIS.

	MALE.		FEMALE.			
	Inch.	Line.	Inch.	Line.	Inch.	Line.
Between the antero-superior spinous processes of the ilia.....	7	8	8	6	to 10	0
Between the middle points of the criste of the ilia.....	8	3	9	4	to 11	1
Through the transverse diameter of the abdominal strait.....	4	6	5	0	to 5	6
Through the oblique diameter of the abdominal strait.....	4	5	4	5	to 5	5
Through the antero-posterior diameter.....	4	0	4	0	to 4	4
Through the transverse diameter of cavity of true pelvis.....	4	0	4	7	to 4	8
Through the oblique diameter of cavity of true pelvis.....	5	0	5	2	to 5	4
Through the antero-posterior diameter of cavity of true pelvis	5	0	4	7	to 4	8
Through the transverse diameter of the perennal strait.....	3	0	4	0	to 4	5
Through the antero-posterior diameter of the perennal strait..	3	3	4	4	to 5	0

By a knowledge of these measurements, there will be the means by which sex may be determined when the pelvis is present, because these dimensions, when compared to the thickness of the bones and the depth of the pelvis, will at once prove the sex, and go so far in the direction of proving identity.

STATURE OF BODY DETERMINED BY LENGTH OF SINGLE BONES.

It is greatly to the assistance of identification when the size of a person can be determined by fragments. The following table affords calculations on the bones of the extremities:

Humerus of $14\frac{1}{2}$ inches length, gives total stature of 5 feet 6 inches.

Ulna of $10\frac{1}{2}$ inches length, gives total stature of 5 feet 8 inches.

Femur of $17\frac{3}{4}$ inches length, gives total stature of 5 feet 7 inches.

Tibia of $14\frac{1}{4}$ inches length, gives total stature of 5 feet 7 inches.

One inch added to the length of the entire skeleton makes the entire length of the natural body.

PRESUMPTIVE TIME LIMITS IN MATTER OF IDENTIFICATION.

What length of absence shall be considered as proof of death? This is a question of importance in jurisprudence in civil practice. Large estates and wills are often held back on account of absent persons. Courts require some determination in such cases. The holdings of courts in different countries have been various in the matter. Upon the trial of an issue in an English court of exchequer (*Benson v. Oliver*, George II, 1732), a deposition was proposed to be read contemplating the opening of a will of a testator presumed to be dead, but the chief baron (Reynolds) held that, in absence of evidence of thorough researches as to the death of the testator

(this not appearing to have been done), the sacredness of "*hand and seal*" would not allow the opening, even though the time had been so long. So this decision required not only length of absence and lack of knowledge, but also researches or endeavors to discover if the party be dead.

In Scotland, eighteen years' absence, without knowledge of the party, gives the presumption of death.

Chancellor Kent, in a case of ignorance of the whereabouts for twenty-two years of one of a family who went away unmarried, decided that it left the presumption of death.

The French code requires thirty-five years' absence, or one hundred years since the *birth* of the absent one, to afford presumption of death.

In the State of New York seven years' absence, and without knowledge, is sufficient, in matters of estates, and five years to allow of remarriage. South Carolina is the same for estates.

In Missouri, "Absence beyond the seas for seven years, without being heard from, raises the presumption of death."—Missouri Reports, 529, *Salle v. Primm*.

PRESUMPTIVE AGES OF POSSIBLE PREGNANCY.

Questions of identity involve an inquiry as to whether natural limits of possible pregnancy will allow of given assumptions, and, therefore, there have been precedents followed to fix legal periods in the limits of possible gestation.

One precedent was made in the recognized time of the pregnancy of Lady Jane Douglas Stewart, which occurred in her fifteenth year of age. This set an English precedent in 1746. It appears, however, that other cases, as early as thirteen years of age, have been recognized in England.

A case of pregnancy at the age of nine years, in a Swiss girl, is reported by Meyer-Brendel, p. 76 ; Metzger, p. 480 ; Beek, Vol. 1, pp. 523-4. But this has made no precedent, that is recorded, in decisions.

In regard to the limits in advanced age, the precedent decisions are more ample. Here, also, we find several records of eccentric cases that appear not to have made precedents. One is reported ("Mem. of Lit.," Vol. 7, p. 78), by the Bishop of Sens, of a man in his diocese, aged ninety-four, and a woman, eighty-three, having a child born to them. Pliny states that Cornelia had a child at sixty. The wife of Ladenberg, Leicester Fields, is reported to have had a pair of twins at the age of fifty-four (Paris, "Med. Juris.," Vol. 1, p. 173).

But there is no statute in England on this matter, and so precedent decisions alone can serve. These seem to fix the limit of possible pregnancy in old age at fifty. This would appear from the decision in the case of *Reynolds v. Reynolds* (Decken. Rep., Vol. 1, p. 374).

The decisions are usually governed by the menstrual period, which begins at twelve and ends at forty-five, as a general rule, and has its *possible* limits beginning at ten years of age and ending at sixty.

POST-MORTEM EXAMINATIONS.

CHAPTER XXX.

THE medical jurist finds nothing of more importance, among all the means of gaining reliable information, than what is afforded by post-mortem examinations, carefully conducted. Nor, indeed, is this experience of any less advantage in pathology and general medical practice. But this treatise being intended only for forensic medical use, the manipulations and researches that are supplied, though thorough in themselves, and thus of broader use, will occupy no more space than necessary.

As a preliminary matter of some importance, and especially in cases of much consequence, where disputations are liable to follow, it is well to have the presence of several experts in all such examinations. In such cases, by all means exclude personally any one who may be in the least degree interested or implicated in the case, if possible, and let such as do stand in such relation be represented by an expert of his or her selection, if so desired.

Avoid an examination by artificial light, if possible, on account not only of deficiency of thoroughness, but because of the lack of such light in developing colors and characteristic tints made by chemicals brought into use by chance or as may be required. Gases also fail to be detected in their escape when the light is unsuitable.

If the body be frozen, it must first be thawed, not by immersion in water, but by exposure in a warm room, with warm, dry surroundings, that may be gently heated and alternately replaced, leaving, however, a blanket next the body, if naked.

For inspections by the use of the microscope, the sections intended for such purpose should, in the first proceeding, be laid aside, but carefully, in *every* particular, and then taken in hand as speedily as practicable.

The operator should bear in mind two essentials, if the proceeding contemplates a medico-legal investigation. These are *thoroughness* and *regularity*. The thoroughness is required to enable the deponent to state not only what *was*, but also what *was not* the cause of death. The regularity is important, first, because, if not performed methodically, some parts may not only be overlooked, but antecedent mutilations may preclude the chance of proper inspection, and, secondly, the reporting in court will require regularity, lest embarrassments might ensue or injustice be done.

All facts, even the details, should be recorded in writing; nothing should be left to memory. Such writing may be of immense service in giving testimony in court, for refreshing thought, and the use thereof is not only excusable, but is regarded as evidence of care and competency, as well as truthfulness.

If convenient, the post-mortem examination should be delayed twenty-four hours after death; but many instances may require different action.

FIRST PROCEEDING.

Examination of Surroundings of Body: For matters of fact, a sketch of the position of things about the body may be of importance at first approach. Often such an incidental attention comes into important service. The noting of the position of the body in regard to surroundings; the articles of furniture and implements, especially if these be such as are of use in violence; then as to table service—glasses, cups, phials or bottles—and noting con-

tents, even though there be food or drink in them, for some drugs are very readily detected by smell or taste. Look for blood-stains or other notable signs incidental to violence. All articles should be marked for identification, if the case seems to require it.

Now, all the above relates chiefly to matters of fact evidence; it is not in a professional line. But this must be remembered—that a physician is not only a *professional* man, but he is also a *citizen*, and may not escape interrogation on matters of fact; and what one is likely to testify to may as well be done *rightly*.

SECOND PROCEEDING.

*Examination of the Body before the Clothes are Removed:**

1. Note as to attitude of body and position of limbs.
2. Ascertain the condition of the clothing—whether entire, cut, torn or perforated. See as to blood-stains or soiling of garments. If cuts or thrusts are found, then see as to direction of the violence that may have occurred; and, if proof-marks are found, then possession must be taken of such sections as have the proof.
3. The hands may now receive attention. Discover if they contain anything, or have evidence of having had anything special in use. Note if marked, scarred, burnt, lacerated, or have any other evidence of violent handling. In all these examinations it is to be observed, if one can, whether the marks, etc., occurred before or after death.
4. The hair—its color, quantity, where existing prominently and how cut; preserve some of it.
5. Teeth require attention; note if regular, wanting, artificial, etc.

* NOTE.—It is convenient to have the items of record numbered in the case-book, so as to be ready for reference.

6. The eyes should be examined as to color, which, unless black, is difficult to ascertain in a dead body.

All these six items are important as mere matters of fact, and relate largely to questions of identity.

7. Post-mortem rigidity, or cadaveric rigidity or relaxation, comes now among the *professional* points.

8. The pupils of the eyes are to be examined scientifically, having been first only glanced at, as matter of fact noting. Now see if the pupils are dilated; if the eyes are staring; if the cornea be transparent or opaque; if the balls be greatly sunken; if the eyes have been subjected to violence, as noted by ecchymosis or laceration.

9. The mouth and tongue must receive attention; is there froth? are there any signs by which ingesta might be detected by the odor, color or corroded state? has the tongue been bitten? is it in natural position?

10. The face now, as a whole, is to receive attention, though this should not have been unobserved at first. The examination, after at first having noted the expression, is to be directed for signs that might lead to what had lately been experienced, especially as to violence. By this means a clew may be had as to the cause of death. The struggles that may have preceded death may be traced in appearances. One can tell, at any rate, pretty nearly whether death was caused by strangling, for then there will be the presence of dark venous blood and a dark face; but this must not be confounded with natural dark skin, or the change that may have been caused by decay. If poisoning by acids, or most of the vegetable poisons, or if violence by blows upon the stomach or other vital organs, caused the death, the face may be pale. If death had been caused by alcohol, or the various oxides, or by chloroform, the face may be red or pale-red. Death by opium, nitrous oxide, carbonic acid and various intoxicating drugs may leave a placid expression of the face. A tragical experience may leave expressions of horror.

THIRD PROCEEDING.

Examine the Body Naked: Here, again, will follow examinations relating to matters of fact simply; but they ought to have attention. They serve for identification primarily, and then they may indicate the causes of death, or prove corroborative of other facts. Professionally, a man may not be responsible for any matters of mere fact, and it will depend on the emergency of the case, or the time one has, whether he is justified in going through all the details of such evidence. Yet, when a case is a notable one, which may be the subject of severe criticism and comment, one naturally feels disposed to get all the evidence possible.

The present proceeding is likely to throw light on the points relating to time of death, and extend the knowledge of the means of death as well.

The specialties are:

1. Temperature, moisture, cleanliness.
2. Cadaveric rigidity.
3. Extent of change, as to decay.
4. Probable height, weight, age and nationality.
5. Sex.
6. State of development, muscularity, temperament.
7. Special condition of body, as to healthfulness, character of signs of disease, as to dropsy, syphilis, consumption, scrofula, etc., to be judged by external appearances.
8. The skin, as to color, marks, scars, ulcers, burns, tattooing, blotches, etc., next come in.
9. Deformities are to be noticed, as club-foot, harelip, rickets and other malformations.
10. Examine all external orifices to ascertain if evidences are there present of violence or obstructions.
11. Next make a special and close examination, by manipulations of the body, to ascertain if injuries may

have been inflicted. Note if any bones are broken, as shown by moving the parts. See if tumors are to be found, indicating presence of projectiles, as bullets, arrows, etc. See if discolorings show ecchymosis, as proving bruises or contusions to have occurred in life or while the body was yet warm, or whether there may be hypostasis, that occurs after cooling of body.

12. Then inspect wounds; if found through the surface, what their extent and directions are. See if the edges of the wounds are retracted or not. Wounds on living bodies retract at edge; those on dead ones are flabby.

Do not probe or dissect as yet, for the notings for such a proceeding are not in place here.

If weapons are found, see if the wounds correspond in character.

Consider whether wounds found might have been self-inflicted; and ascertain by the wounds what kind of an instrument may have caused them.

When the Case is of a Child: Children, in addition to the foregoing particulars, require examination as to special questions, such as will afford probable clues to motives of death. Maternal infanticide is always most likely to occur in early life. The facts regarding ossification, therefore, can be brought in evidence; also, the help of measurements and notings of development.

When the Case is of a Female: Female bodies, in addition to the general examinations so far delineated, require to be closely inspected for evidence as to violations, by attacks upon their virtue. Such may have occurred in advance of murder, and, if so, the signs are such as are to be seen in cases of injuries to the *living* body, and discriminations are to be made.

Is it the body of one that was pregnant? Then such state and period of pregnancy can be determined. Such particulars are to be found under proper heads in this treatise.

The question of virginity needs, in some cases, to be specially ascertained, and ought never be neglected when a complete post-mortem examination is to be made.

FOURTH PROCEEDING.

Matters Precedent for Internal Examination: The first particular to be considered is to make out the special object of the examination, so that this object may receive the earliest attention. Because, for instance, if the death should have been caused by chloroform, prussic acid, oil of bitter almonds, etc., it is very important that this particular should have attention before the evidences, alone sufficient, often, for determining their agency, are dissipated. Hence, it is well always to first see to this particular before time is lost in giving attention to internal organs. The passages to the lungs and stomach should, therefore, be closely inspected before cutting is done. Or, if the case be suspected to be one of poisoning by inhalation, then the lungs should receive attention first.

NOTE.—It is well, in examining the cavities of the body and discovering collections of matter, that pains be taken to know whether they are post-mortem hypostases, or whether they may have been ante-mortem depositions from tumors or from extravasations.

EXAMINATION OF THE BRAIN.

FIRST PROCEEDING.

Opening of the Skull: It is well to remove the hair, by cutting or shaving away, where the cutting is to be done, and, having effected this, make an incision down to the bone, across the skull from ear to ear, and turn back the

flaps, with slight lateral cuts at margin next to the ear. In doing this, it is to be noted, as one point of value in the proceeding, how much blood flows from the cut. Next give attention to ascertain if there be any fracture of the skull or any signs of contusion. Now saw carefully a circular cut about the skull, about half an inch above the meatus auditorius externus; then remove the cap and inspect the dura-mater. This done, the dura-mater is to be removed, by carefully cutting with a blunt-pointed scissors, or a bistoury, and an exploration made of the arachnoid and pia-mater. These membranes and the dura-mater may be found injected and variously changed and discolored, affording signs of either disease or of violence, or poisoning; and, accordingly, a discrimination is of importance.

SECOND PROCEEDING.

Removal and Inspection of the Brain: First, the surfaces and convolutions of the brain are to be carefully inspected. The sinuses are to be spread carefully with the flat handle of the scalpel, assisted with the fingers. The base around the margin of the cut bone is to be noted as to its appearance.

Having thus proceeded, the next step is to cut the brain by a clean slicing down from above, and dividing off. The inspection here is for appearances of discolorings, softening or hardening, injection, extravasation of blood, in clots or other form; of serum, lymph, pus, or any other abnormal appearance. Aneurisms may be discovered, or tumors of various forms and colors or consistence, and these are to be examined to ascertain if they be of recent, soft, hard, or of purulent, appearance. They may, also, be of malignant character, and the odor is to be observed.

When the skull has been fractured, there may be splinters of bone or projectiles, as a bullet or other obtruded substance, that may need attention.

The following are the particulars that are to be noted in the inspection of the skull and brain :

1. The character, thickness and condition of the skull and extent of the *diploë*.

2. If fractures appear, note them—their extent, direction and character.

3. The membranes, *dura-mater*, *pia-mater* and *arachnoid* ; see if injected, contused, softened, or otherwise diseased or injured.

4. Then the brain must be inspected, and every particular is to be carefully noted as found, either alone or by the effects of alcohol, acids or alkalies applied to portions thereof. For other chemical tests some portions are to be removed and so examined.

5. The color of the brain, with the shading thereof, is to be noted.

6. The presence of mechanical or foreign substances, and their character, number, size and consistence must have attention.

7. Discriminate in case of tumors, or other morbid growths—as to whether of recent or chronic character, which may be ascertained by the intricacy of texture, firmness and presence or absence of inflammatory appearances.

8. The injections must receive attention, to know, if of blood, whether in coagula or fluid, whether appearances of organization thereof exist or not. Notings of the vessels are to be made, whether dilated, injected, hardened or softened ; and, if injected, then the nature and consistence of the injected matter.

9. Hemorrhages are to be inspected, if present, and their extent and character noted.

10. Finally, the substance of the brain; its consistency—softness, hardness and color; and whether granulated or morbidly organized, must be noted.

EXAMINATION OF THE SPINAL CORD.

FIRST PROCEEDING.

Opening of the Vertebral Canal: Proceed by cutting and sawing the vertebral laminae through on each side (front and back diameter), on each side of the spinous processes, being careful to keep as near them as possible, in order to free the cord, so that it may be removed without injury.

SECOND PROCEEDING.

Removal of the Spinal Cord: Having now exposed the cord invested by the dura-mater, it is to be carefully removed without disturbance of the investment, and thence first examined entire. By manipulation with the fingers, as by letting the cord pass between the thumb and fingers, it may be discovered whether there be hardening or softening of the cord substance, which is of some import.

Observe, also, before opening the investment, its condition as to color, and whether injected. Note likewise if there be signs of injuries, as by laceration, etc.

Then sections are now to follow; the cord is to be—in a portion thereof—laid open longitudinally, and carefully inspected. While no appearances of damage may be discovered on the outside, the interior may yet show much sign thereof. The dura-mater is tough and resisting, while the brain substance in the cord is very delicate. This may present various appearances in consist-

ence and condition of integrity. Like the same substance in the brain itself, this may have the characteristic softening, or be otherwise damaged.

It is particularly important that the upper part of the spinal marrow be carefully inspected, because it is here where injuries are most fatal. Any obtrusion into the marrow above the third cervical vertebra will cause instant death. Sometimes sharp instruments may have been thrust through between the vertebra, and the cord be thus penetrated. There is no time in the effect that ensues for occasioning signs of inflammation, and hence the only discovery may be a spot of discoloration, and, at the place, a slight disorganization, that may be detected by a glass of small power.

The presence of splinters or fragments of bone is to be looked for. When the vertebrae have been fractured, there are sometimes small splinters thrust into the cord, and these are so delicate, occasionally, as to be readily unobserved.

After several laminae of the cord have been cut away and carefully inspected, there are to be transverse cuttings made, so that inspections may be made by the eye alone, or with the use of a glass.

EXAMINATION OF THE THORAX.

Unless there have been special demands for doing otherwise, as by any suspicion of a particular cause of death, it will be an orderly proceeding to go on from the examination of the brain and spinal column to the examination of the chest. But if there be no real cause for an antecedent examination of the spinal marrow, that proceeding had best be deferred until the thorax be examined from the front, because of the liability of doing

damage to the viscera of the chest by the cutting of the vertebræ. Where death may be suspected by asphyxia, it may be advisable to proceed at the outset with the examination of the heart.

FIRST PROCEEDING.

Opening of the Chest: Proceed with the knife in hand laterally—having the thumb on the back of the blade—to the cutting of the sterno-clavicular ligaments and cartilages of the ribs. This may be a difficult proceeding with the knife only, when the subject is old, because of the calcified condition of the cartilages, and so cutting-pliers, or a saw, may have to be brought into requisition.

Note now if blood escapes, and judge its quantity and appearance, being careful not to wound the large vessels about the neck.

Disengage below and reflect the sternum upward over the face.

SECOND PROCEEDING.

Examination of the Thoracic Viscera: Before proceeding in this it will be necessary to observe if there has been any discharge of blood, by accidental injury to any large vessels, in the removal of the sternum. There may have been an accident to the internal mammary, the internal jugular, or the innominata.

In such case the quantity is to be noted and the blood sponged away.

Next, the pericardium and pleural cavities are to be opened and the viscera examined. The first step will be to ascertain what the interjections may be—whether there be blood, in any form, and of what appearance; or whether there be serum, and how much; whether purulent matter, and how much.

Examination of the Heart: After the pericardium has thus been opened, the heart should be scrutinized. Its size and position are to be noted; the fullness of the coronary vessels observed, and color and other appearances taken account of.

Then, while the heart remains in position, the auricle and ventricle in front may be opened and contents noted, severally, and the relative amount of blood or other contents taken account of. The blood should be noticed in reference to fluidity, or whether coagula exists. Its constitution may be best determined afterward, but it is well enough to put the glass in use as one goes along.

The heart may now be removed and further examined as to the contents of the other chambers, and the condition of the valves.

The weight of the heart with and without its contents should be noted.

The consistence of the tissue is not to escape criticism, by employment of the microscope, used afterward, and, at present, by the common lens.

The thickness and texture of the walls of the auricles and ventricles are to have attention, and notings as to hypertrophy, or hypercæmia, are to be made; also, observation as to fatty degeneration. The deviations from relative natural capacity of the cavities are to be noted, if any exist.

In examining the valves, their condition for mechanical movement must be inspected, and the presence of threads of fibrine and appearance of atheromatous degeneration not overlooked.

The aorta must be examined for presence of aneurism or atheroma, and the vena cava needs attention.

Examination of the Lungs: First, observe external condition and appearance as to color, whether naturally pinkish, or whether red, gray or black. Note whether

there be signs of inflammation on the surface, as evinced in exudations, color and injections.

Then the lungs are to be opened by long incisions of sections in longitudinal and transverse directions, and the tissues examined:

1. What is the condition for inflation?
2. Is the tissue generally dense, indurated, carnified, crepitant, soft or hard?
3. What are the appearances on pressure? Does fluid escape, and, if so, what is its character as to consistency, color and quantity?
4. Note next the condition of the bronchial tubes and the pulmonary artery. This is best done by laying them open by the use of scissors. Look now for the presence of foreign matter, and let the glass or microscope afford its services.

NOTE.—The lungs of the recently born child should be examined to determine whether respiration had ever been established. For special description of these particulars the reader is referred to what is given on the subject under the head of "Infanticide." But here it may be repeated that when the lungs have never been inflated they are in a collapsed state, and do not fill the cavity, nor approach the mediastinum, nor cover the pericardium. Their color is dark maroon, and not bright vermilion tinted. For specially inspecting, as to the least appearance of respiration having occurred, examine more carefully the concave surface of the upper lobe of the right lung and its edges. As stated elsewhere, in case of non-inflation, the lungs lie close back and above, are very diminutive, with thin, sharp-defined edges, compact, non-crepitant, and when cut and pressed, under water, do not cause air to escape and thus form bubbles.

Hydrostatic Test of Texture: The object of this is to determine if the lungs of a child may afford proof of live birth. This test has already been given under "Infanticide," and need not receive extended attention.

A first method may be to ascertain if there had been sufficient expansion of the lungs to float the thoracic viscera. For this purpose all are to be placed in a basin of water, and thus determine if the lungs will sustain all in a buoyant state.

If this test is unsatisfactory, then a portion of the lungs may be thus tested alone. But the surest method of determining (when, by suspected change in putrefactive process, the lungs may be puffy), is by taking fragments thereof, wrapping them in cloth, and thus subjecting them to severe pressure. If the lungs had ever been inflated by natural respiration, then the air can not be pressed out by this means, and the fragments will still float in water; but if the child had never breathed, the fragments will sink, because the air may be expressed thus. Some direct the testing of the lungs of the recently born child to ascertain whether there may be meconium or mucus present in the air-cells. But this test is not of much value, as it does not prove whether the child had drawn in these materials by respiration. The greater presumption would seem to be, when they are present, that they were forced into the lungs by mechanical pressure.

Examination of the Larynx, Trachea, Pharynx and Esophagus: To conduct the proceeding for these examinations, it is necessary to prolong the incision up to the chin, and, reflecting the skin as far as practicable, the knife is thrust upward, immediately under, and below, the symphysis of the lower jaw, letting it emerge into the mouth, and carrying it along close to the inner surface of the inferior maxillary on each side to the extent

of the bone. Now seize the tongue from below through the opening thus cut, and, dividing the parts, bring it forward; then down, by dividing through the velum pendulum palati, so as to take in the trachea and œsophagus.

Open these passages to ascertain their condition, and whether there are any substances lodged within them, and to discover whether they are corroded by poisons or affected by inflammation.

The carotid arteries should also be examined by carefully slitting them open.

EXAMINATION OF THE ABDOMEN.

There may be cases in which it may be important to open the abdomen before the thorax when children, recently born, are to be examined to determine as to whether they had ever breathed or not. The object is to ascertain the position of the diaphragm and abdominal viscera by this advance opening before these parts are displaced by the emptying of the thorax, as also before the escape of blood into these parts by the cutting for the opening of the chest. But, in doing this, it is not necessary to proceed further than to note these particulars, and the parts can then be left as they are until after the examination of the thorax. The propriety of not dissecting the abdomen first is because that, if the blood-vessels in the abdomen are first cut, the blood will run out of the heart, and thus this organ would be left in a state of collapse, especially the auricles, and so damage the examination thereof afterward.

Opening the Abdomen: This is done by making a long incision from a little above the top of the sternum, through the skin only, down to the pubis; then proceed-

ing to reflect the skin sufficiently by this extensive cut, so as to admit of a proper reflection of the parietes of the abdomen. This done, the muscles or parietes are to be cut, either with the blunt-pointed knife or by cutting between the fingers as they are passed along under the parts as the incision is prolonged; reflecting thence by lateral cutting, when required, the abdomen is laid open. As this is being done, the escape of gas, if any, is to be noted.

The viscera of the abdomen, after noting the condition of the peritoneum, can then be examined in detail, according as the special objects demand, as to precedence, except that the kidneys may best be allowed to remain until the other parts are taken away.

Examination of the Stomach and Bowels: Proceed by placing a ligature around the œsophageal end of the stomach, as close to the diaphragm as is convenient, and then two others an inch, or a little less, apart around the first part of the duodenum; now cut above the first ligament, between it and the diaphragm, and next between the other two, and then remove the stomach. This can then be laid aside if its examination is not of importance; but most usually it is, when immediate reports are desired.

Otherwise, when the stomach is made the object direct, the organ may be laid open, after careful inspection of its exterior. On opening it observe every thing that strikes the eye and affects the sense; gas may escape, and its odor may indicate the presence of certain poisons. The contents are then to be placed in a clean jar, for further examination.

Now, before washing or scraping, the inner surface is to be carefully inspected with a lens for the discovery of poisons, which may be present, still undissolved, such as corrosive sublimate, arsenic, or phosphorus; seeds, leaves,

capsules or other portions of poisonous plants may be present in various stages of division. Then the mucous membrane must receive attention. This is to be inspected before rinsing such part or cleaning it in any way.

For chemical tests, portions are to be cut away and kept in close-stopped bottles until inspected. No washing or cleaning, further than emptying its ingesta, should now be done; portions thereof may then be washed and examined when clean. If chemical reagents are to be brought into use for the discovery of the presence of any suspected poison, this is usually effected afterward; but, whether postponed or not, the stomach is not to be washed before testing.

The examination of the intestines is to be made section by section, tying as one proceeds, so as to avoid soiling, or otherwise occasioning accident.

The inspection of all these parts must be made in reference to contents; also, the condition of the villi, mucous coat, glands, etc. Note the appearance of the tissues, whether inflammatory, or whether there be ulcers or excoriations.

Examination of the Liver: The liver is easily lifted out; tying of the hepatic vein may be desirable. If the hepatic artery be tied above the cutting, bleeding may be prevented when the vessel is open and entire above.

The *appearance* of the liver is to be first noticed, and the color specialized—whether normally and regularly purple-brown, or whether mottled or otherwise discolored.

It should be weighed.

It should be examined in its texture, and for this purpose variously divided, a portion being put up in a clean jar for chemical analysis.

Various knots, tubercles, cavities of ulcers, cists containing various fluids, granular conglomerations, hardenings, softenings, fatty degeneration, etc., all require special inspection.

The gall bladder must receive its special attention ; its size, fullness, consistence of contents and its weight are to be noted ; also, its ducts and their contents.

Examination of Kidneys and Spleen : First, before taking them out, the appearance of the kidneys and their surroundings should be ascertained. They should be weighed, and on opening them in their larger diameters (in length and width), so as to lay open the cavity, they afford a ready inspection of their vascular structure. Note their contents here. The cortical, capsular and vascular parts need separate examination. In all these parts there may be various materials to be separately preserved for future inspection.

The spleen needs less attention. Its surface externally should be examined, and it should then be weighed ; then its internal texture and character may receive attention.

Examination of the Bladder and Appendages : First, examine externally the bladder, prostate gland, ureters and urethra, and note the size of all ; carefully preserve the urine for analysis. Then open the bladder and inspect its internal surface, and whatever it may contain, besides urine ; note the odor and color of the urine and the consistence thereof ; pass a blunt-pointed bistoury along the ducts, and lay them open for inspection.

Examination of the Vagina, Uterus and Ovaries : The vagina is to receive attention first. Note its color, condition of hymen, its rugæ, texture of walls and presence of signs of inflammation, ulceration or malformations.

The uterus next claims attention. Examine it externally and note its size and position ; ascertain the condition of the mouth, examining with a lens when any special inspection requires it. Then lay it open, from fundus to cervix, with the knife. First, see as to its contents ; these should be laid aside for future inspection,

unless they were the object especially of the examination; then inspect the inner surface, and see what is the comparative size of cavity, and then examine the mucous membrane with a lens; note if the appearances are normal or otherwise—whether congested or covered with mucus; whether of dark or light appearance; whether there be present tumors, ulcers, etc. Ascertain, also, as to texture—if hard or soft.

The ovaries should now be examined. Note their position and general appearance; their size—contracted or swollen state; whether of granular or glandular character. Take a lens and examine the ovules; see if there be cicatrices of escaped ovules, and how many. Examine the state of the Graafian vesicles; see as to the presence of true or false corpora lutea. All these particulars should be carefully noted separately, and the entries made distinctly, for after comparison, in case that any theory of the matter should need discussion.

NOTE.—It is important in all post-mortem examinations where poisoning is suspected and parts are saved for analysis, that these parts be very carefully guarded, to prevent substitution of other portions for the real ones by any one that may have an interest in the case. Fraud may thus defeat the object of the examination.

Thus, when, during dissection, parts are laid away for the time being for future examination, they must not be permitted to be handled. In putting them up they ought to be securely sealed by a private seal and labeled, giving name of the deceased person and time of autopsy. This should then be signed by the person who conducts the examination, and kept in the possession of him or some proper official, and by himself or the officer personally passed to the chemist who makes the analysis, if he does not make this himself. The materials are portions of or

the entire stomach, portions of the intestines, liver, lungs, kidneys, tongue, throat, œsophagus, etc., and of blood, urine and contents of the stomach and bowels. The examination by chemical analysis should be done as soon after the specimens are put up as possible, to prevent change by decomposition, which may affect the properties of the poisons contained, especially if they be of organic substances. If any thing be added for preservation, the added preservatives must be pure and weighed before adding, so as to indicate its quantity, and its name and chemical sign should be given ; but it is always best to add nothing.

When parts are taken for examination by the microscope, when trichinosis is suspected, they should be of the stomach, diaphragm, or pieces of muscles of any part, particularly of the pectorals.

TABLE NO. 1.

SHOWING WEIGHT AND MEASUREMENTS OF IMPORTANT STRUCTURES OF THE
BODY—MALE AND FEMALE. (AVERAGE SIZE).

ORGANS.	WEIGHT.		MEASUREMENTS, ETC.
	Male.	Female.	
Brain.....	49½ oz.....	44 oz.....	
Spinal cord.....	1 to 2 oz.....	1 to 1½ oz.....	15 to 18 inches long.
Thymus gland.....	½ oz. (exists only in infants).....		
Thyroid body.....	1 to 2 oz. (largest in females).....		
Lungs, right.....	24 oz. } 45 oz.	17 oz. } 32 oz.	
“ left.....	21 oz. }	15 oz. }	
Heart.....	9½ oz.....	8¾ oz.....	Usually of the size of same person's fist.
Orifices of.....			
Mitral.....			4 inches circumf.
Tricuspid.....			4½ inches circumf.
Aortic.....			3 1-6 inches circumf.
Pulmonary.....			3½ inches circumf.
Stomach.....	4½ oz.....	4 oz.....	10 to 12 inch. by 4 to 5
Liver.....	50 to 60 oz.....	45 to 55 oz.....	12 by 4 inches.
Spleen.....	5 to 7 oz., but variable.....		
Pancreas.....	2¼ to 3½ oz.....		
Kidneys.....	4¾ to 5½ oz.....	3¾ to 5 oz.....	The left is larger than the right one.
Supra capules.....	1 to 2 drams.....		
Ureters.....			14 to 16 inches.
Prostate gland.....	6 drams.....		
Testicles—both.....	¾ to 1 oz.....		
Uterus (unimpregn'd).....		7 to 13 dra.....	3 by 2 inches—1 thick
Ovaries—both.....		120 to 200 grs..	
Bladder.....	Variable—often larger in female		May hold a quart or more.

GENERAL TABLE AFFORDING APPEARANCES OF THE FŒTUS AT DIFFERENT

	END OF 1 MONTH	END OF 2 MONTHS.	END OF 3 MONTHS.	END OF 4 MONTHS.
LENGTH ...	3 to 5 lines.	16 to 19 lines.	2 to 3 inches.	5 to 6 inches.
WEIGHT ...		150 to 300 grains.	480 to 720 grains.	2½ to 3 ounces.
MEMBRA. PUPILARIS.			Visible.	Present.
HAIR				
NAILS				Begin to appear.
GENERAL POINTS.	Eyes indicated by two black spots. Liver fills abdomen.	Rudiments of the nose and lips discernible. Placenta begins to ap- pear in shape.	The fingers begin to appear separate. Vein-trunks of heart dis- tinct. Eyelids appear, with line of margins.	Features assuming shape.
POINTS OF OSSIFICATION.		At 5th week, ends of clavicle. At 6th, lower jaw. At 7th, scapula, hu- merus, ribs, femur, tibia, palate and up- per jaw. At 8th, frontal bone.	Occipital, sphenoid, squamous portion of temporal bone.	Upper part of the sa- crum and the pubic bone.
DEVELOPMENT OF THE GENITAL ORGANS.		Penis (or the clitoris) is visible — not distin- guishable as to sex.	Penis (or the clitoris) very long; sex not distinguishable.	The genital organs are now distinct as to sex. Scrotum and prepuce appear.

PERIODS OF UTERO-GESTATION. — AMERICAN (UNITED STATES) SUBJECT.

END OF 5 MONTHS.	END OF 6 MONTHS.	END OF 7 MONTHS	END OF 8 MONTHS.	END OF 9 MONTHS.
6 to 7 inches.	9 to 10 inches.	13 to 14 inches.	14 to 16 inches.	16 to 21 inches.
5 to 7 ounces.	1 pound to 2 pounds.	3 to 4 pounds.	4 to 5 pounds.	5 to 10 pounds.
Present.	Present.	Disappearing.	Mostly disappeared.	Entirely disappeared.
Slight appearance.	White or silvery.	Quite noticeable.	Various color.	Color & quan- tity variable.
Distinct.	Border free.	Reach not to extremities.	Reach to extremities.	Fully developed.
Meconium found in large intestines. Points of teeth appear. External ear formed.	Meconium more dis- tinct in large intes- tines. Skin begins to show a fibrous texture; is purplish in color.	Meconium occupies the whole length of large intestines. Eyelids separated. Bile in gall-bladder.	Fetus generally com- plete in form, but shows lack of perfect maturity.	Meconium in rectum. Eyelids open. Full signs of maturity.
	Four divisions of the sternum distinguish- able.	Astragalus.	Last vertebra of sa- crum. There is no center of ossification now in the cartilage of inf. extr. of femur.	
Commencement of the definition of uterus and vagina.	Testes near the kidneys. Walls of the uterus thicken.	Testes further off from the kidneys than at the sixth month.	Testes descend into the external ring.	Testes have passed the inguinal ring, and are often found in the scrotum.

TABLE No. 3.

SHOWING LENGTH OF PARTS OF BODY AS CORRESPONDING TO THE WHOLE—IN THE CHILD AND THE ADULT.

OF THE CHILD.

AGE.	FULL STATURE.	TRUNK.	SUP. EXTREM.	INF. EXTREM.
1 year.	1 ft. 10½ in.	13 in. 6 lines.	From acrom. 9 in.	From pubis 9 in.
3 years	2 ft. 9 in.	19 in.	From acrom. 1 ft. 7 in.	From pubis 14 in.
10 years	3 ft. 8 in.	2 feet.	From acrom. 1 ft. 9½ in.	From pubis 1 ft. 8 in.
14 years	4 ft. 7 in.	2 feet 4 in.	From acrom. 2 ft. 6 lines	From pubis 2 ft. 3 in.

OF ADULTS—MALE.

AGE.	FULL STATURE.	TRUNK.	SUP. EX.	INF. EX.
20 to 25 years	5 ft. 8 in.	Crown to pubis, 34 in.	30 inches.	32 inches.

From pit of stomach to the navel.....	6½ inches.
From the navel to top of pubes.....	6½ “
From top of shoulders to fold of elbow.....	12½ “
From the fold of the elbow to the top of the hand....	10 “
From top of hand to tip of middle finger.....	7¾ “
From top of inside of thigh to inside of knee joint....	14½ “
From top of inside of thigh to sole of foot.....	18½ “
From back of heel to point of great toe.....	9¾ “

ADULTS—FEMALE.

In estimating the average height of the male at five feet eight inches, that of the female is to be put at five feet five inches—or the male sixty-eight inches and the

female sixty-five inches—and hence this allowance of $\frac{3}{8}$ is to be made for the difference in measurement of lengths between the male and female. When the bones are measured, it is to be borne in mind that the skeleton of the average size measures just one inch less than the body would if living. The bones of the pelvis, chest and skull, in male and female, as compared, differ; those of the pelvis of the female are relatively larger, and conversely, also, those of the chest and head of the male.

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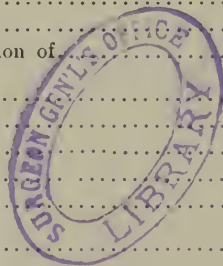
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